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B.C. Hydro

SUMMARY OF ECONOMIC AND LOAD FORECASTS

1984/85 — 1994/95

LOW–PROBABLE–HIGH

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SUMMARY

I. SUMMARY OF ECONOMIC AND LOAD FORECASTS

This document presents B. C. Hydro's forecasts of economic activity and resulting electricity and natural gas gross load requirements to 1994/95. A range of projections are presented for electricity and natural gas consistent with the low, probable, and high economic growth forecasts.

The comparison of this year's probable economic, electricity and natural gas forecasts to 1994/95 relative to the probable forecasts prepared in July 1983 for the same period is tabulated below:

B. C. HYDRO
ECONOMIC AND LOAD FORECASTS[1]

	July 1984	July 1983
Economic		
B. C. Gross Domestic Product in 1994 (Billions of 1971$)	21.7	25.1
Average Annual Growth Rate 1983 to 1994 (%/year)	2.8	4.1
Electric Service		
Gross Electric Requirements 1994/95 (GW.h)	45 040	49 500
Slippage in 1994/95 Relative to Previous Forecast	3 years	
Average Annual Growth Rate 1983/84 to 1994/95 (%/yr)	3.0	3.9
Gas Service		
Total Sales 1994/95 (TJ)	108 557	125 044
Average Annual Growth Rate 1983/84 to 1994/95 (%/yr)	1.7	3.0

[1] Economic Forecasts are on a calendar year basis whereas Electric and Gas Forecasts are on a fiscal year basis.

Figure 1

REAL BC GROSS DOMESTIC PRODUCT

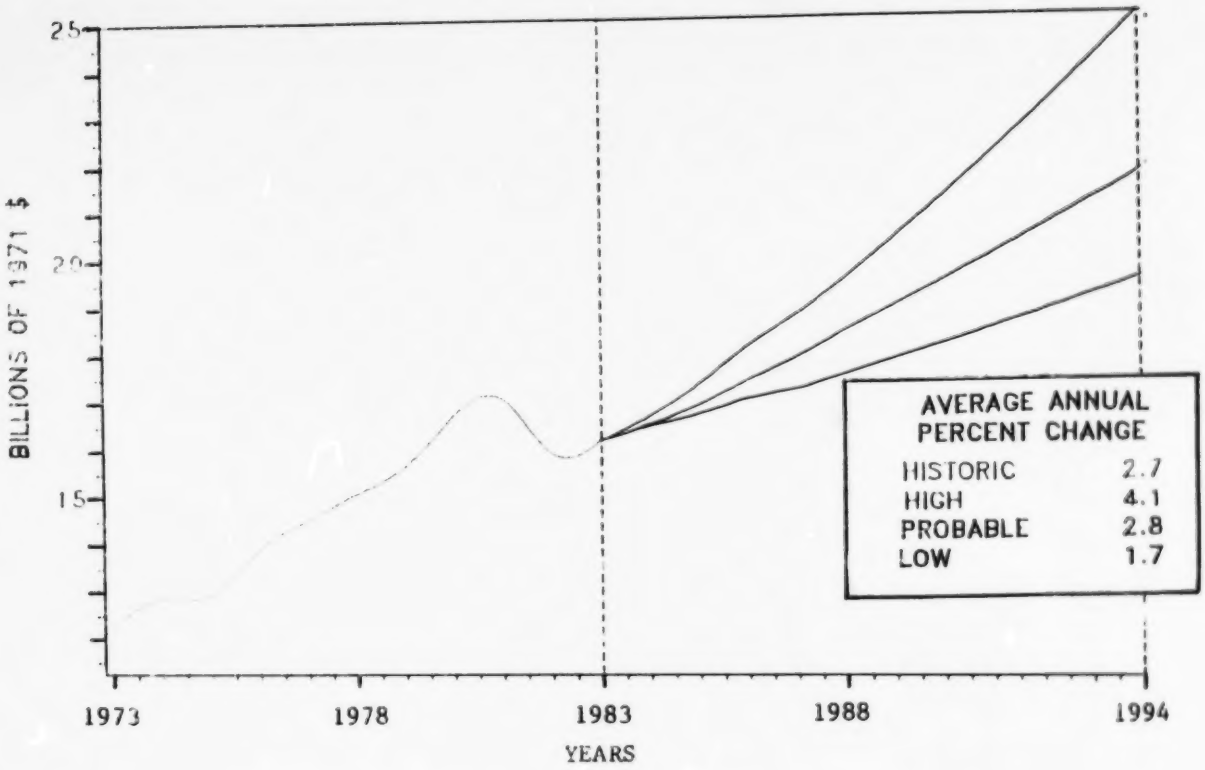
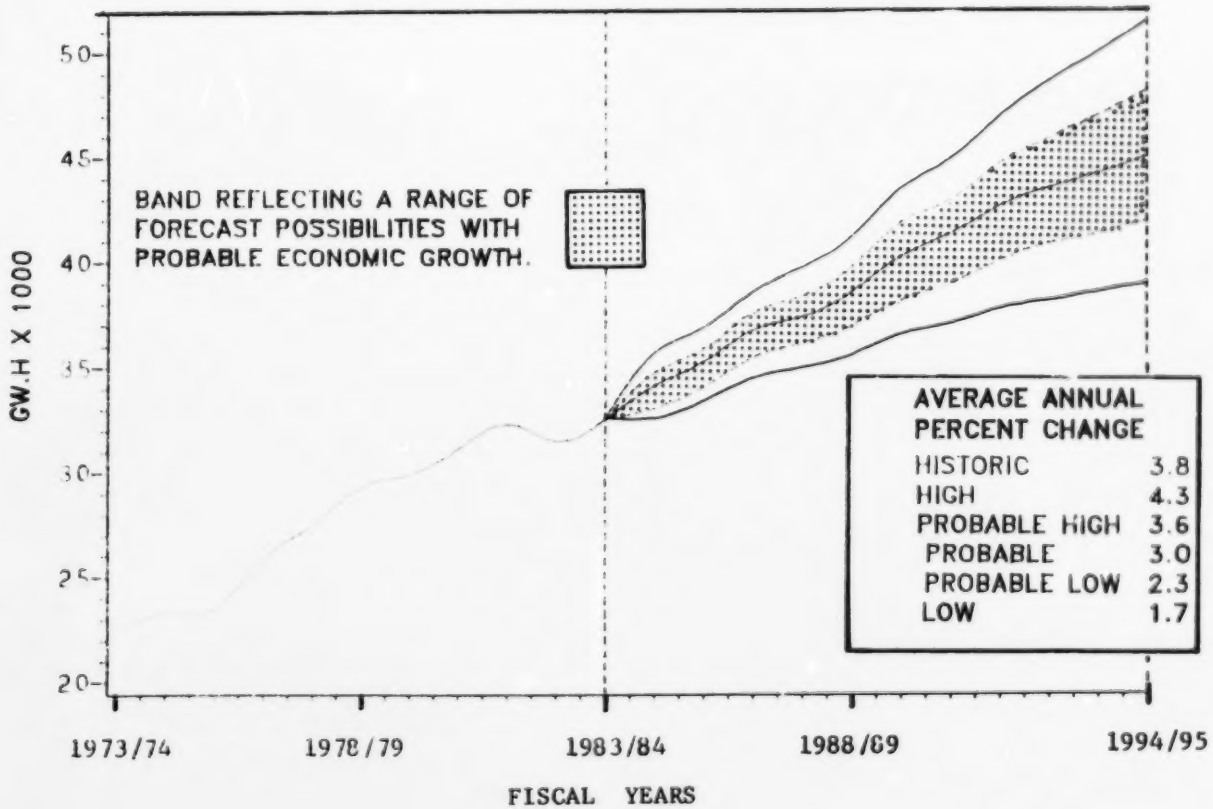


Figure 2

BC HYDRO TOTAL ELECTRIC REQUIREMENTS



Economic Forecast

The B. C. economy is expected to average 2.8% real annual average growth over the 11-year period to 1994. The decline in Real Gross Domestic Product growth from the 4.1% annual rate forecasted last year is largely the result of a more pessimistic outlook for the 1984 to 1986 period. Whereas last year's forecast showed 5.4% annual growth for this 3-year period, the current forecast is only 2.5% per year, largely due to the following:

- a less optimistic outlook for the metal mining sector relative to last year's forecast due to increased competition and lower prices;
- uncertainty with respect to the labour market and restraint programs;
- declining real disposable income and higher unemployment rates; and
- lower estimates of exports.

As a result of this lower economic growth, estimates of net-migration to B. C. have been reduced. Consequently, population growth has been revised downward from 2.0% per annum forecast last year to 1.8% per annum.

Electric Service Forecast

The forecasts of electric requirements presented graphically in Figure 2 include:

- low, probable, and high electric forecasts based on the low, probable, and high economic growth forecasts, respectively; and
- a band around the probable electric forecast reflecting the range of electric requirements that could occur with the probable economic growth forecast.

The probable electric energy requirements are forecast to increase at an average annual growth rate of 3.0% per year from 32 545 GW.h in fiscal 1983/84 to 45 040 GW.h in 1994/95. All electric forecasts presented herein assume natural gas on Vancouver Island in 1987/88.

The reduction of the electric service forecast from the July 1983 load forecast to the July 1984 forecast results primarily from:

- lower residential and commercial sales as a result of lower population and lower real B. C. GDP growth;
- lower sales to the metal mining industry; and
- lower sales to West Kootenay Power and Light.

The reduction, relative to last year's forecast, in the electric requirement forecast is less than for economic growth. This is largely the result of the growth in the most energy intensive sector, thermo-mechanical pulp production, remaining at essentially the same level as last year. However, as in the case of the economic forecast, the growth in forecast electric requirements

for fiscal years 1984/85, 85/86 and 86/87 are reduced fairly substantially from last year.

Gas Service Forecast

The probable natural gas requirements are forecast to increase at a somewhat lower rate than electricity, averaging 1.7% per year from 90 533 TJ in fiscal 1983/84 to 108 557 TJ in 1994/95.

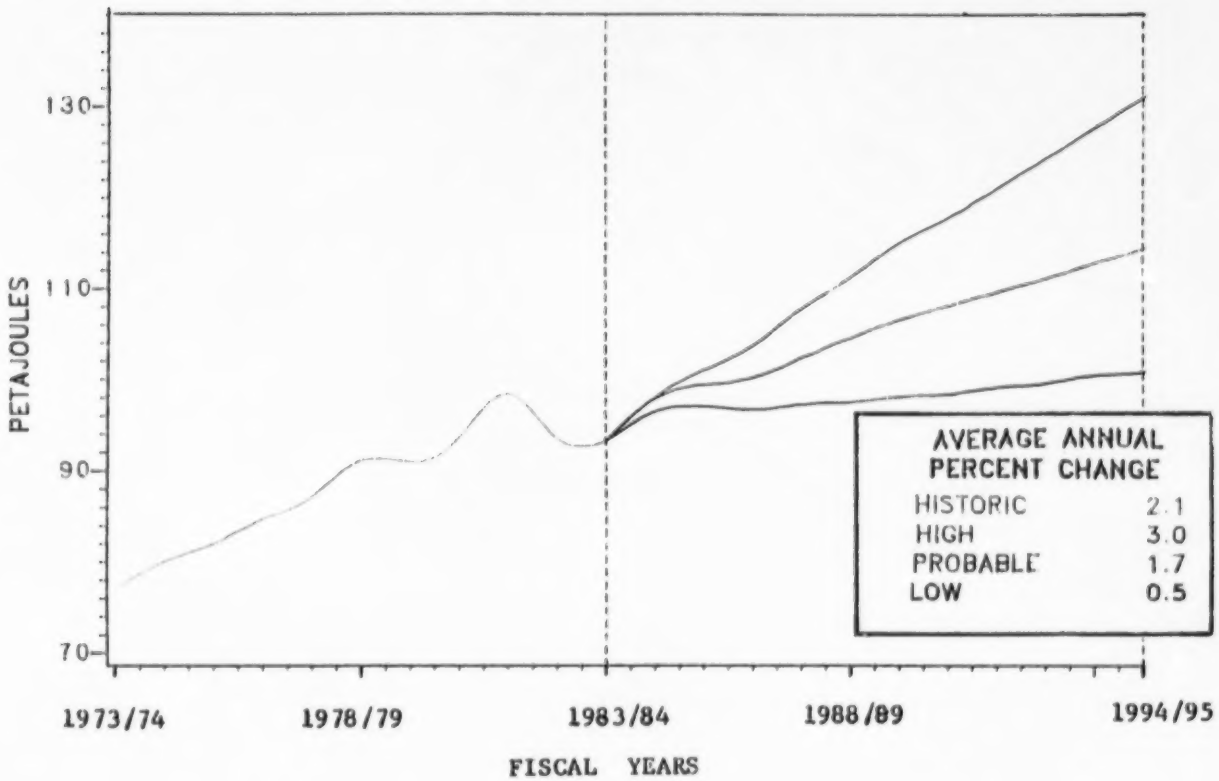
The reduction in the natural gas forecast is caused by reductions in the industrial and residential components of the forecast which in turn are the result of:

- a decline in the growth rate of population and household formation;
- lower capacity utilization and natural gas consumption at the refineries due to transfers of refined petroleum products from Alberta refineries through the Trans Mountain Pipeline;
- the strong evidence that the two cement plants, which are the largest customers, will switch at least a substantial part of their load away from natural gas;
- the increasing likelihood that major natural gas consuming projects will not be located in the Lower Mainland area as a result of strong public environmental concerns; and
- natural gas prices forecast to increase relative to oil.

The text that follows provides the details of the economic and load forecasts, the methodologies employed in developing them and the linkages between the economic forecasts and the forecasts of electric and gas requirements.

Figure 3

BC HYDRO TOTAL NATURAL GAS REQUIREMENTS



ECONOMIC FORECASTS

II. ECONOMIC FORECASTS

1. BASIS OF FORECASTS

This section of the report contains forecasts of real economic activity, inflation rates, interest rates, and housing starts for the U.S. and Canada, plus further detail for the British Columbia economy in terms of sectoral growth rates, population growth, unemployment rates, and energy prices.

Various forecasting approaches were utilized in the preparation of the economic projections. Econometric analysis was used extensively for the macro and sectoral forecasts. Chase Econometric's U.S. forecasts served as the main reference point for the U.S. macro indicators. These indicators, plus assumptions regarding such items as the likely course of Canadian monetary and fiscal policies, oil prices and production, investment, and exports of major commodities, functioned as the main drivers of the simulations of the Canadian economy. Chase Econometric's twenty-year model of the Canadian economy was used for these simulations.

To arrive at the B. C. macro forecasts, a number of independent analyses were undertaken. Consulting studies were commissioned for the forest, coal, metal mining and smelting and LNG and petrochemical sectors to provide indications of the likely future growth of these key B. C. sectors. Inputs from these studies were employed in the bottom-up approach which consisted of forecasting the growth in value-added in production for all major sectors and aggregating the growth rates to infer total provincial economic growth. The Central Statistics Bureau's short-term quarterly provincial model was utilized to obtain short-term macro forecasts of the B. C. economy based on the B. C. sectoral inputs as well as assumptions relating to inflation, interest rates, exchange rates, and economic production indicators for Canada and its major trading partners. The four-year B. C. forecasts were then extended to the long-term using a "share equation" model developed in-house which forecasts aggregate GDP, as well as seventeen different sectors.

Several other models were also employed in the forecast preparation. Population projections were derived from an internal demographic model which incorporated assumptions regarding fertility, mortality, and net-migration. An internal energy model provided estimates of B. C. oil and petroleum products and natural gas prices based on forecasts of world oil prices, inflation and exchange rates. Further, future B. C. Hydro average selling prices for electricity were approximated using B. C. Hydro's Corporate Financial Model.

The results derived from these forecasting approaches were reviewed both internally and externally and synthesized to provide forecasts for the three distinct economic growth scenarios that were considered. The main assumptions of the probable economic growth case are as follows:

- monetary policy in the U.S. will be relatively stable throughout the forecast period and Canada is expected to maintain its managed exchange rate policy; no major international debt crises are expected to occur during the forecast period and thus interest rates remain relatively stable;

- positive interest rate differentials between Canada and the U.S. are maintained to attract foreign capital and to keep the value of the Canadian dollar relatively stable;

- high levels of government deficits are slow to decrease. However, attempts on the part of governments to decrease deficits are exercised through restraint on public wages, social benefits and capital spending;

- no real price increases for world oil are anticipated in the near-term; a real growth of 1% per year after 1990 is assumed. Western Canada will enjoy some investment in the energy sector i.e. generally small scale rather than mega-project in nature;

- substitution of capital and high technology for labour will inhibit dramatic reductions in unemployment rates;

- only modest progress will be made in structural changes to the B. C. economy. The economy will remain very vulnerable to economic cycles and heavily dependent on the U.S. Shifts toward economic diversification and increased value-added will be gradual; no significant improvement in consumer and investor confidence; and

- B. C. will experience low net-migration and population growth; natural gas exports to the U.S. from B. C. will increase modestly by 1990; the Vancouver Island Gas Pipeline project is assumed to be operational by 1987.

Briefly, the key assumptions of the low economic growth scenario are a significant increase in protectionism and unmanageable international debt financing which creates pressure on interest rates and government deficits. The high economic growth scenario however, assumes a movement to freer international trade and more accommodative monetary policy.

2. U.S. ECONOMY

Forecasts of the U.S. economy's short- and long-term prospects are presented in Table 1. Under the probable economic growth case, the U.S. economy is projected to continue to experience moderating economic expansion for the remainder of 1984. Continued consumer optimism and enhanced business confidence with corresponding positive impacts on consumer expenditures and non-residential fixed investment, plus some inventory rebuilding, are expected to lead to healthy real GNP growth of 5.5% in 1984. U.S. real economic growth is forecast to decelerate in 1985 with 3.0% growth. This slowing will largely result from increased inflationary expectations, continuing high federal deficits, and the bottom of the present investment cycle.

After a relatively mild downturn, the U.S. economy is expected to resume its growth path and register a 4.0% increase in real GNP in 1988. Over the 1989 to 1994 period, U.S. real economic growth is projected to average approximately 3.0% which is somewhat lower than the 3.3% average growth rate experienced since 1961.

Table 1

PROBABLE ECONOMIC GROWTH CASE
KEY ECONOMIC INDICATORS

Economic Indicator	Historical		Forecast					
	1971-1982	83	84	85	86	87	88	Avg. 1989-1994
United States								
Real GNP (% Change)	2.6	3.4	5.5	3.0	3.2	3.5	4.0	3.0
Inflation CPI (% Change)	8.2	3.2	4.8	5.5	5.9	5.6	5.4	5.0
Interest Rate								
91-Day Treasury Bills	7.8	8.6	11.5	12.5	10.5	10.0	9.0	8.0
BCH 10 Year Bond Rate		11.5[1]	14.0	14.25	13.5	13.25	12.5	10.0
BCH 30 Year Bond Rate		12.5[1]	14.5	14.75	14.0	13.75	13.0	10.5
Housing Starts (Millions)	1.6	1.7	1.7	1.45	1.55	1.60	1.65	1.7
Canada								
Real GNP (% Change)	3.0	3.0	4.0	2.5	2.5	3.0	3.2	2.8
Inflation CPI (% Change)	9.2	5.8	5.2	6.5	6.7	6.0	5.8	5.5
Unemployment Rate	7.3	11.9	11.2	9.8	9.2	9.6	9.6	8.5
Interest Rate								
90 Day Finance Co. Paper	9.9	9.5	12.0	13.0	11.5	11.0	9.8	8.5
BCH Long-Term Bond Rate		12.6[1]	14.25	14.5	14.25	14.0	13.5	11.5
Housing Starts (Thousands)	218	161	169	165	158	160	164	170
Exchange Rate	92.5	81.1	76.5	77.0	77.5	78.0	79.0	81.5
British Columbia								
Real GDP (% Change)	3.8	1.8[2]	2.0	2.5	3.0	2.8	3.1	2.8
Vancouver CPI (% Change)	9.2	5.5	5.0	6.0	6.5	6.2	5.8	5.5
Population (Thousands)	2185[3]	2824	2862	2907	2958	3011	3067	3427[4]
(% Change)	2.3	1.2	1.4	1.6	1.8	1.8	1.9	1.9
Households (Thousands)	668[3]	1051	1078	1105	1134	1163	1193	1376[4]
(% Change)	3.8	2.4	2.6	2.5	2.6	2.6	2.6	2.4
Labour Force (Thousands)	899[3]	1389	1407	1438	1488	1517	1545	1740[4]
(% Change)	3.7	1.4	1.3	2.2	3.5	2.0	2.0	2.0
Unemployment Rate	7.9	13.8	15.0	14.5	13.5	13.0	12.0	10.0
Housing Starts (Thousands)	33	22.6	19	26	29	28	29	30
Single (Thousands)	18	15.1	12	13	13	13	14	14
Multiple (Thousands)	15	7.5	7	13	16	15	15	16

[1] Estimated.
[2] Preliminary estimate.
[3] Value for first year of period shown.
[4] Value for last year of period shown.

The dramatic decline in inflation experienced in 1983 resulting primarily from the recession and tight monetary policy is not forecast to continue. On the contrary, as the U.S. economy remains in its expansion phase, some rebound in the CPI is expected. It is estimated that CPI inflation will escalate from the 3.2% rate recorded in 1983 to between 5 and 6% per annum from 1984 to 1988. In the longer-term, the dampening of inflationary expectations will likely maintain CPI inflation at a 5.0% annual average rate versus the 5.6% average rate experienced from 1961 to 1983.

The outlook for interest rates is premised on the view that the U.S. Federal Reserve Board remains committed to keeping inflationary demand pressures in check, while at the same time, attracting foreign capital. Consequently, in the near-term the Federal Reserve Board is not expected to alter its tight monetary policy stance. Therefore, interest rates are forecast to edge slightly upwards in response to the strength of the economy, concern about the size and financing of the deficit, and rising business loan demand. As shown in Table 1, 91 Day Treasury Bills are forecast to average 11.5% in 1984 and rise gradually to peak at 12.5% in 1985. This upward drift in interest rates will have adverse short-term effects on financial markets and negative impacts on the expansion of private sector financing needs in the medium-term. In the longer-term, 91 Day Treasury Bill rates are forecast to average 8.0%.

In 1984, the U.S. housing sector is forecast to maintain the 1.7 million level achieved in 1983. However, as the economy decelerates, higher interest rates materialize, and consumer optimism dwindles, the strong pace of starts will not be sustainable. The housing sector is forecast to decline to a low of 1.45 million starts in 1985, with gradual improvement thereafter. Housing starts in the long-term are projected to average 1.7 million units annually.

3. CANADIAN ECONOMY

Since the beginning of the North American recovery in 1983, Canada has realized substantial benefits from the U.S. expansion largely via strong export growth. Domestically, there has been limited strength in consumption due to meager real personal disposable income growth. The continued improvement in consumer optimism that is expected in 1984 resulting from some employment growth, moderate inflation, and modest income gains should allow the household sector to provide some support to Canada's 1984 economic performance. Business non-residential investment, however, which typically contributes to growth during the expansion period of the business cycle shows few signs of significant activity and is not expected to add much economic stimulus this year. Despite this inherent weakness in the economy, Canada is forecast to turn in 4.0% growth in 1984 which will be primarily export-related (see Table 1). Beyond 1984, as in the case of the U.S., Canada is forecast to experience deceleration in economic activity, reaching the bottom of the cycle in 1986 with 2.5% growth. Higher interest rates and reduced consumer optimism as well as a deteriorating foreign trade sector are expected to dampen Canada's growth during this time period. The long-term outlook calls for real GNP to advance by 2.8% per year on average.

With regard to inflation, Canadian CPI inflation is expected to drop from a 1983 rate of 5.8% to 5.2% in 1984. After 1984, inflation is forecast to follow the U.S. inflationary trend quite closely, reaching a peak of 6.7% in 1986 and averaging 5.5% annually in the longer-term.

Despite the economic growth expected in the short-term, only slow improvement in the unemployment rate is forecast. Reduction in the unemployment rate will be constrained, since job creation is expected to be greatly offset by labour force growth with both new entrants and "discouraged worker" re-entrants into the labour force. As a consequence of this labour market slack, wage escalation is forecast to be moderate which will have corresponding positive impacts on Canada's inflation rate. It is only in the long-term that the unemployment rate is projected to fall below 9.0%.

The hefty U.S. deficit has maintained U.S. interest rates high which have caused large short-term capital flows with a resultant strong U.S. dollar. In order to avoid following every boost in U.S. rates, the Bank of Canada has permitted some narrowing of Canadian - U.S. interest rate differentials as well as allowed the Canadian dollar to slide below U.S. $0.77. Canada's current account surplus is expected to remain fairly healthy. The continuing U.S. expansion, an eventual recovery in resource prices plus revival of the Japanese and European economies (which together take 80% of Canadian exports) should swell Canada's exports, while relaxed domestic growth should limit import growth in the short-term. With this current account surplus and positive Canada - U.S. interest rate differentials, the Canadian dollar is expected to hover in the U.S. $.76 to $.79 range in the short-term and around U.S. $.81 in the longer term.

Canadian interest rates will move roughly in line with those in the U.S. As indicated in Table 2, the Canadian 90 Day Finance Company Paper rate is forecast to increase from 12.0% in 1984, peaking at 13.0% in 1985 and averaging 8.5% annually in the long-term. Rates in the long end are also expected to follow the same trends as the short-rates over the forecast period. The B. C. Hydro Composite Bond rate is expected to rise from 12.7% for fiscal 1984, reaching 14.4% in fiscal years 1985 and 1986 and downtrending to average 10.75% thereafter.

The residential sector in Canada will remain heavily influenced by consumer confidence and purchasing power in the short-term. Since some improvement in real disposable income and continued optimism is anticipated in 1984, housing starts are forecast to register 169 thousand units, up from 161 thousand units in 1983. However, with unemployment at high levels, increasing interest rates, and deteriorating income growth which is expected as the Canadian economy decelerates, the rate of starts is forecast to fall to a low of 158 thousand in 1986. Over the long-term, demographic trends indicate an average level of 170 thousand starts annually.

Table 2

INTEREST RATES
%

	U.S.			Canada		
	91 Day Treasury Bills	B. C. Hydro 10 Year Bond Rate	B. C. Hydro 30 Year Bond Rate	90 Day Finance Co. Paper	B.C.Hydro Long-Term Bond Rate	B. C. Hydro Composite Bond Rate[1]
Historical						
1982	10.9	14.0[2]	15.0[2]	14.2	15.5[2]	15.5[3]
1983	8.6	11.5[2]	12.5[2]	9.5	12.6[2]	13.9[3]
Forecast						
1984	11.5	14.0	14.5	12.0	14.25	12.7[3]
1985	12.5	14.25	14.75	13.0	14.5	14.4[4]
1986	10.5	13.5	14.0	11.5	14.25	14.4[4]
1987	10.0	13.25	13.75	11.0	14.0	13.8[5]
1988	9.0	12.5	13.0	9.8	13.5	13.6[6]
1989	8.0	10.0	10.5	8.5	11.5	12.5
1990	8.0	10.0	10.5	8.5	11.5	10.75
1991	8.0	10.0	10.5	8.5	11.5	10.75
1992	8.0	10.0	10.5	8.5	11.5	10.75
1993	8.0	10.0	10.5	8.5	11.5	10.75
1994	8.0	10.0	10.5	8.5	11.5	10.75
Avg 1984-94	9.2	11.6	12.1	9.8	12.7	12.3

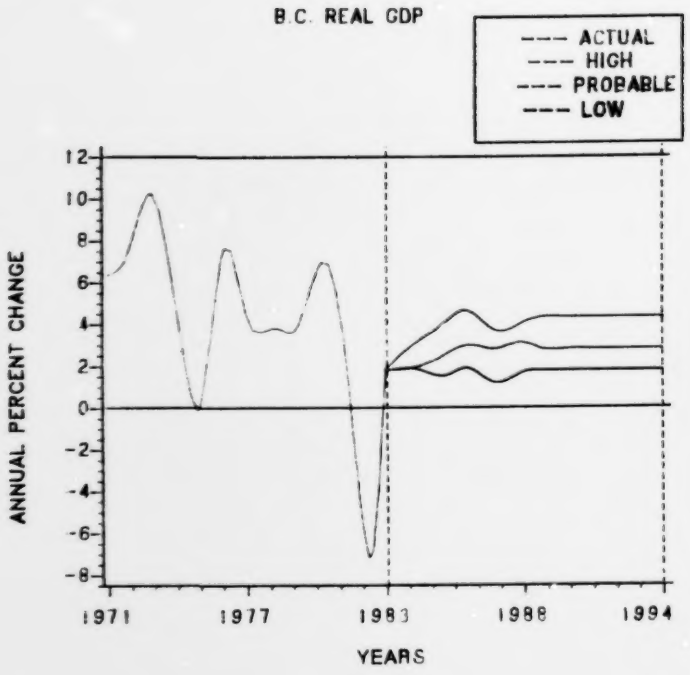
1 Fiscal year ending 31 March.
2 Estimated.
3 Average effective annual interest cost of long-term debt during the fiscal year.
4 Fiscal 1985 and 1986 estimates based on 100% borrowings in U.S. market (half at 10 year rate, half at 30 year rate).
5 Fiscal 1987 estimate based on 80% borrowings in U.S. market (half at 10 year rate, half at 30 year rate) and 20% borrowings in Canadian market.
6 Fiscal 1988 to 2004 estimates based on 60% borrowings in U.S. market (half at 10 year rate, half at 30 year rate) and 40% borrowings in Canadian market; note that in the forecasts, no allowance has been made for changes in the exchange rate during period nor discount, commission and expenses.

4. B. C. ECONOMY

4.1 Key Indicators

Typically, B. C.'s economic condition is highly dependent on international developments. The U.S. economy has experienced a strong improvement but the economies of a number of B. C.'s other key trading partners have not been as robust. Consequently, the B. C. economy enjoyed only a lean, rather lopsided recovery in 1983 with an estimated 1.8% real GDP growth (see Figure 4). In 1983, the forest sector operated near full capacity but mining and domestic demand were not as healthy. Consumer spending and investment were disappointing as a result of the high rate of unemployment and excess capacity, retrenchment of corporate balance sheets, and restraint programs.

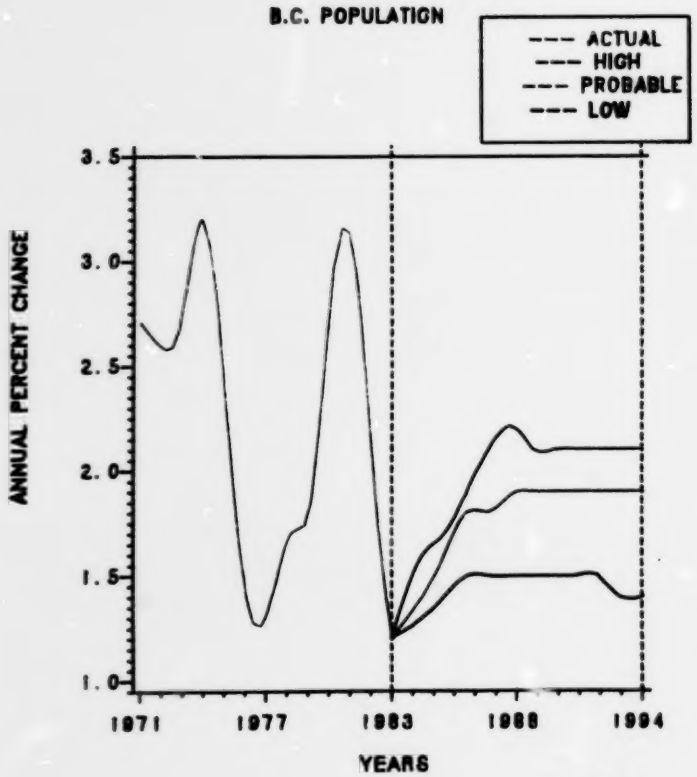
Figure 4



Historical	Billions of 1971 $	Annual % Change
1971	10.400	6.3
1972	11.152	7.2
1973	12.289	10.2
1974	12.872	4.7
1975	12.883	0.1
1976	13.859	7.6
1977	14.465	4.4
1978	15.009	3.8
1979	15.580	3.8
1980	16.648	6.9
1981	16.981	2.0[1]
1982	15.792	-7.0[1]
1983	16.077	1.8[1]
Forecast		
1984	16.399	2.0
1985	16.809	2.5
1986	17.313	3.0
1987	17.798	2.8
1988	18.349	3.1
1989	18.863	2.8
1990	19.391	2.8
1991	19.934	2.8
1992	20.493	2.8
1993	21.066	2.8
1994	21.656	2.8
11 Year Avg. (1983-94)		2.8

[1] Preliminary Estimates

Figure 5



Historical	Population in Thousands	Annual % Change
1971	2184.6	2.7
1972	2241.4	2.6
1973	2302.4	2.7
1974	2375.7	3.2
1975	2433.2	2.4
1976	2466.6	1.4
1977	2499.4	1.3
1978	2542.3	1.7
1979	2589.4	1.9
1980	2666.0	3.0
1981	2744.2	2.9
1982	2790.1	1.7
1983	2823.9	1.2
Forecast		
1984	2862	1.4
1985	2907	1.6
1986	2958	1.8
1987	3011	1.8
1988	3067	1.9
1989	3124	1.9
1990	3183	1.9
1991	3242	1.9
1992	3303	1.9
1993	3365	1.9
1994	3427	1.8
11 Year Avg. (1983-94)		1.8

The outlook for 1984 continues to be discouraging; real GDP is forecast to grow by just 2.0%. Real B. C. economic activity is not anticipated to recover to the 1981 level until 1985. Continued resiliency of the forest sector, some improvement in consumer spending, and investment and construction relating to Expo 86 should cause real GDP to advance by 2.5% in 1985. Real economic growth is forecast to peak in 1986 at 3.0% due to Expo 86 and its impact on B. C.'s service sector, activity in the mining and transportation sectors, and construction of the Vancouver Island Gas Pipeline. In the long-term, B. C. economic growth is forecast to advance by roughly 2.8% per year on average, which is approximately two-thirds of the historical annual rate since 1961. The B. C. economy is expected to continue to be vulnerable to economic cycles and remain strongly dependent on the U.S. The provincial economy will experience modest structural shifts with the service sector contributing progressively more to the underlying strength of the economy.

Briefly, the low economic growth forecast indicates provincial growth averaging about 1.7% per year to 1994. In the high economic growth case, a strong recovery is forecast with the economy advancing 4.1% on an annual average basis to 1994.

B. C. inflation, as measured by the Vancouver Consumer Price Index and presented in Table 1, is projected to move in line with Canadian CPI trends. After achieving a significant drop in inflation from 10.5% in 1982 to 5.5% in 1983, a further decline to 5.0% is anticipated for 1984. This expected easing will be largely attributable to the combined effects of restraint programs, low levels of capacity utilization in many B. C. sectors, moderating wage settlements and high unemployment.

With the pickup of economic activity beyond 1984, inflation is forecast to move slightly upwards and peak at 6.5% in 1986, then drop off to 5.8% by 1988 and average 5.5% annually in the long-term, which is considerably lower than the 9.2% average rate over the 1970's and early 1980's period. Major factors that are expected to lead to this long-term price performance are lower energy prices, productivity gains, reduced expectations and the direction of U.S. and Canadian monetary policies.

As shown in Figure 5, the growth in B. C.'s population in both the short- and long-term is expected to slow from historical rates. B. C.'s population growth is estimated to rise gradually from 1.4% in 1984 to 1.9% in 1988 reflecting the modest upturn in provincial economic activity and corresponding impact on total net-migration. A 1.8% annual growth rate in B. C. population is projected in the longer-term compared with 2.5% average growth per year over the 1961 to 1983 period.

High rates of unemployment are expected to continue to plague the provincial economy. The provincial unemployment rate is forecast to deteriorate even further in 1984, registering 15.0% versus a 13.5% rate in 1983. There is not much on the economic horizon which would indicate dramatic improvement in the short-term. With considerable labour market slack, a fairly bleak investment outlook as well as deteriorating exports particularly as the U.S. enters its downturn, the unemployment rate is expected to edge downwards slowly reaching a still very high 12.0% rate in 1988. The provincial unemployment rate is forecast to average 10% annually in the long-term.

Despite the serious unemployment situation, moderate wage gains, and slightly higher interest rates forecast in the near-term, modest improvements in provincial housing starts are expected, reaching a level of 29,000 starts in 1986. A portion of these units will result from Expo 86. In the long-term, with population growth substantially below historical rates, housing starts are projected at around 30,000 annually, again below the 33,000 annual level of the 1970's.

4.2 Sectors

The sectoral forecasts have been divided into goods and service producing sectors as shown in Table 3[1]. Currently, the service sectors contribute nearly 60% of the total value of goods and services produced by the provincial economy. Based on the investment projections for the forecast period, the service sectors' share of total provincial economic activity is forecast to continue to increase, reaching approximately 63% of total real GDP by the year 1994.

Among the service sectors, tourism and business and personnel services should achieve the highest percentage growth. Major factors in these developments will be an increase in leisure activities, a higher number of world tourists choosing B. C. as their vacation destination and further socio-economic interrelations between B. C. and Pacific Rim countries. Financial services and transportation will continue to grow at a healthy rate, but lower than anticipated in previous forecasts. Further, retail trade activities and their impact on commercial developments will be severely affected by the province's serious unemployment problem. Consumer spending should also experience a decline from the fast pace achieved during the 1960's and early 1970's, compounding the above effect. In anticipation of Expo 86, real estate investment leading to the expansion of the operating capacity of business, personnel services and accommodation and food services is currently taking place. This rate of growth, however, is not sustainable beyond 1986, and indeed some of this capacity may prove to be in oversupply until the late 1980's.

Within the goods producing sectors, forestry and mining will remain as the main drivers of the economy. The economic health of these sectors is expected to continue to determine the dynamics of most of the service sectors. The forecast increase in the service sectors' share of provincial activity has important structural implications for B. C. Income distribution, patterns of consumer spending and standards of living will provide a moderating effect on provincial demand and growth.

Table 4 presents forecasts of production in B. C.'s forest and mining sectors to the year 1994. Most mining products will experience declining growth between 1984 and 1987 and flat performance thereafter. Increases in both thermal and metallurgical coal production are expected due to the opening of new mines in the Northeast in 1983-84 and the development of two new small high-quality thermal coal mines (Quinsam and Telkwa). Coal quality, proximity to existing transportation facilities, and anticipated improvements in market conditions are key incentives to developing these two mines.

[1] Corresponds to the Standard Industrial Classification (SIC) categories of Industrial and Commercial, respectively contained in the Electric and Gas Forecasts sections.

Table 3

B. C. SECTORAL GROWTH

PROBABLE CASE

	Average Share of Economy 1961-1982	1983 Estimated Actual Value	Real Average Annual % Change							Average Share of Economy 1994
			83	84	85	86	87	88	Avg 89-94	
	%	$ Millions								%
Goods Producing										
Agriculture	1.5	209	2.0	1.9	2.0	2.5	3.2	3.0	3.0	1.5
Fisheries	0.4	20	0.0	0.0	2.0	3.0	2.0	1.0	1.0	0.1
Forestry	10.4	1,392	29.0	0.0	8.0	8.0	-1.0	0.0	3.3	10.4
Mining	5.8	620	-5.0	15.0	11.0	9.0	0.0	7.8	5.5	6.2
Manufacturing	7.9	980	2.1	1.8	2.0	2.0	3.5	3.5	2.5	6.8
Construction	7.5	1,076	1.8	1.7	2.2	1.9	3.0	2.8	2.0	7.2
Total Goods Producing	33.5	4,297								32.2
Service Producing										
Financial Services	12.2	1,562	1.0	1.5	2.0	1.0	2.1	2.3	2.4	10.4
Trade	13.4	1,718	-3.0	1.3	1.8	2.4	3.8	3.5	2.5	12.0
Transportation and Communication	10.5	1,802	0.0	2.0	2.8	2.0	3.8	3.5	2.6	12.8
Utilities	3.6	638	2.0	1.0	0.5	2.0	2.8	3.0	1.5	4.0
Community, Business & Personal Services	19.8	3,183	1.0	2.4	2.2	3.4	4.0	3.8	3.4	24.1
Total Service Producing	59.5	8,903								63.3
Government	7.0	790	-5.0	-2.0	0.0	1.0	1.8	1.5	1.0	4.5
Total Real GDP	100.0	13,990	1.8	2.0	2.5	3.0	2.8	3.1	2.8	100.0

Table 4

B. C. FORESTRY AND MINING PRODUCTION

PROBABLE CASE

	1982 Production	Average Annual % Change						
		83	84	85	86	87	88	Avg 89-94
Forestry								
Lumber[1]	10,108	29	-7	0	6	-1	-5	3.3
Plywood[2]	1,430	24	3	1	3	-5	-3	-2.5
Pulp[3]								
- Chemical	3,725	8	-18	17	25	-12	9	1.1
- Mechanical	1,217	26	-4	12	3	3	8	6.6
- Total	4,942	13	-14	16	18	-8	9	2.9
Newsprint[3]	1,199	11	-7	10	-6	-1	0	-5.0
Other Paper & Paper Board[3]	721	16	9	33	-1	-8	18	7.8
Mining								
Coal[3]								
- Thermal	2.4	-8	22	-7	0	40	31	11.8
- Metallurgical	8.4	10	41	0	0	-8	0	0.0
Copper[4]	268.6	8	5	8	2	0	-4	1.0
Molybdenum[4]	10.1	-34	-13	-14	56	0	0	-2.8
Zinc[4]	204.0	10	11	0	0	20	0	2.2
Lead[4]	113.0	6	-4	0	0	0	0	0.0
Silver[4]	485.0	-10	-6	-9	0	4	20	0.3
Gold[5]	7.6	4	4	11	16	7	-17	-5.1

1 Millions of Board Feet
2 Thousands of Cubic Meters
3 Thousands of Metric Tonnes
4 Thousands of Metric Tonnes
5 Metric Tonnes

The coal industry is forecast to operate at about 60% of actual capacity for most of the 1984-1994 period. It is possible that some industry rationalization takes place and the lowest cost producers increase market shares and are able to increase capacity utilization to more acceptable levels. The major market for coal will continue to be Japan, particularly their steel industry which is forecast to decline at about 1% per year over the next two decades. In metal mining, problems of oversupply, production cost, product substitutions, ore quality, reserve depletion and competition from underdeveloped countries are some of the variables that will constrain local production.

The assessment of the Liquified Natural Gas (LNG) market indicates that forecasts of lower economic and electricity growth in Japan have reduced the need for LNG projects around the world, and lower crude oil price forecasts have reduced the viability of the potential projects.

Currently, the pulp and paper industry is enjoying a renewed demand for its products and prices are firming up close to U.S. $540 per tonne for pulp and U.S. $580 per tonne for newsprint. Market conditions in North America and Europe have improved remarkably and most industry analysts believe that the strong demand should sustain higher sales throughout 1984 and 1985. Conversely, the lumber sector has recently experienced a significant drop in lumber prices and still faces some financial problems associated with the huge inventories of chips accumulated during the pulp and paper strike that must now be written-off in part due to product decomposition. The current lumber glut in the North American market is expected to persist in the short-term since U.S. housing starts are forecast to drop off until 1987.

Availability of raw materials may become a key restrictive factor toward the mid 1990's for the forest sector. The outlook rests on the basic assumption that generally the forest industry will recognize the need to increase productivity and better utilize raw materials. Guided by this principle, new technologies will be adopted and emphasis will shift to higher value-added products such as fine paper, tissue and writing and printing papers in the pulp and paper industry, for example. Among the most promising technologies are CTMP and TMP with capital requirements at approximately one-third of more traditional pulping mills. Major investments expected include two new CTMP mills within B. C. by 1989 and two more by the mid-nineties. In addition, three or four new lines in existing integrated mills are expected to be operational by 1994.

4.3 Energy Prices

4.3.1 Electricity Prices

B. C. Hydro's future electricity prices, i.e. rates based on revenue requirements, will be a function of its sunk costs in existing facilities, the load growth, operating expenses, costs of new facilities to meet the load growth, the cost of financing, the interest coverage achieved over the forecast period, the level of taxes imposed on electricity sales and export revenues. The actual year to year rate increases will be the subject of a series of hearings before the British Columbia Utilities Commission. It is not the purpose of

this exercise to attempt to anticipate how those rate increases will take place but rather to establish the likely long-term trend.

This trend in future electricity prices is calculated using B. C. Hydro's Corporate Financial Model. The analysis starts with the existing and committed costs and incorporates projections of capital and operating costs. Whereas operating costs are charged through to the customer each year as incurred, the costs of capital facilities are recovered in the form of interest and depreciation over the lives of the facilities. For a given load forecast and system plan, the model calculates the costs of production for each year of the forecast period and then the average percentage change in rates from one year to the next to achieve the required financial criteria.

The future electricity prices calculated from the Corporate Model and shown in Table 5, are based on the projected load growth of some 3.1% per annum to 1994/95; the generation plan required to meet that load; the interest, inflation and exchange rates outlined in the previous sections; and B. C. Hydro reaching an interest coverage ratio of 1.3 by 1990/91.

The load forecast is not sensitive to the short-term swings in real electricity prices shown in Table 5. For forecasting purposes an average selling price over the eleven year period was assumed which is equivalent to that of the price series generated by the Corporate Financial Model.

4.3.2 Natural Gas Prices

Natural gas prices are a function of production and transmission costs and government policies which determine the level of taxes. The proposed policy to move the B. C. wholesale price from about 44% currently to 65% of the Vancouver blended crude oil price in 1990 forms the basis for the forecast of the average B. C. Hydro natural gas selling price.

Assuming that the international price of crude oil remains constant in nominal terms to 1985 (i.e. declines in real terms) then starts to rise in real terms with increases of 1% per annum being achieved after 1990, and that the prevailing pricing structure for old and new domestic oil in Canada continues, B. C. Hydro's natural gas prices are projected to increase by 2% per annum in real terms to 1990/91 and increase marginally thereafter due to lower cost of service charges.

The energy price forecasts are summarized in Table 5 in terms of price indexes for the B. C. Hydro average selling prices for electricity and natural gas and the blended price of crude oil in Vancouver on which the gas price forecast is based.

Table 5

HISTORICAL AND FORECAST
ELECTRICITY, NATURAL GAS AND CRUDE OIL REAL PRICE INDEXES
(Base 1983/84 = 100.0)

	B. C. Hydro Average Selling Price		Vancouver Blended
	Electricity	Natural Gas	Crude Oil Price
Historical			
1973/74	80.3	49.5	26.1
1974/75	76.0	55.3	37.9
1975/76	81.9	54.7	42.0
1976/77	85.9	58.4	45.0
1977/78	93.3	68.0	49.4
1978/79	96.1	75.2	53.8
1979/80	94.5	70.5	54.0
1980/81	97.1	70.8	61.6
1981/82	90.2	94.0	92.1
1982/83	99.4	100.8	97.8
1983/84	100.0	100.0	100.0
Forecast			
1984/85	101	101	96
1985/86	103	104	91
1986/87	104	106	87
1987/88	106	108	84
1988/89	108	110	81
1989/90	111	113	80
1990/91	114	115	81
1991/92	109	116	81
1992/93	103	117	82
1993/94	98	118	83
1994/95	93	118	83

Note: Historical and Forecast price levels are all expressed in constant dollars, e.g. a real increase in prices of 1% is equivalent to a nominal (i.e. actual) increase of about 6.5% with the 5.5% inflation.

ELECTRIC FORECASTS

III. ELECTRIC FORECASTS

1. BASIS OF FORECASTS

The population, economic and energy price forecasts and sectoral information described in the previous section are translated into electricity requirements using a "top down/end use" approach to forecasting. The top down aspect of the approach entails the use of the population and economic forecasts and sectoral studies to project the household formation, commercial activity and industrial production that generate the need for electricity. The end use focus consists of analysis of how various customers presently use electricity and how consumption patterns are likely to change in the future.

The end use approach to forecasting differs from the econometric approach in that it does not involve the use of equations based on historical relationships between energy use, energy prices and other economic variables to estimate the effects of price changes on load growth. Rather the effects of prices are examined by first establishing the scope customers have for changing electricity use by measures such as: installing more efficient appliances and higher levels of insulation, choosing an alternative source of energy for heating, switching to more efficient lighting, substituting other energy sources or modifying the way electricity is used in existing industrial processes, changing industrial processes, or self-generating electricity rather than purchasing. Having established the scope for changing electrical use, the responses of customers are estimated based on the energy price forecasts.

2. PROBABLE FORECAST

The principal components of the July 1984 Probable Load Forecast to 1994/95 are summarized in Table 6 and Figure 6.

The forecast growth rate in Residential sales of 2.3% per annum is less than half the rate experienced over the past ten years. This relatively low growth rate, which is slightly below that forecast in 1983, reflects a slower growth in population and household formation than over the past decade. Use per household is expected to remain essentially constant at the 1983/84 level. Although households will tend to have more appliances and a larger percentage of households will use electric heat, these potential increases in use are offset by improved appliance efficiencies, higher levels of insulation and a trend towards apartments and row houses.

Commercial sales are also forecast to grow considerably slower than the historical rate and somewhat slower than was forecast in 1983. The lower growth rate is primarily due to moderate growth in floorspace (caused in part by the lower real B. C. GDP growth forecast) combined with lower unit electricity requirements in new buildings and gradual retrofitting of existing buildings with more efficient equipment.

Approximately 5 600 GW.h of the 11 197 GW.h increase in total billed sales expected between 1983/84 and 1994/95 are for industrial customers. This increase results in a growth rate of 3.5% per year which is above the growth rates for residential and commercial customers. Table 7 presents a breakdown of the Industrial sales increase to 1994/95 by type of industry.

Figure 6

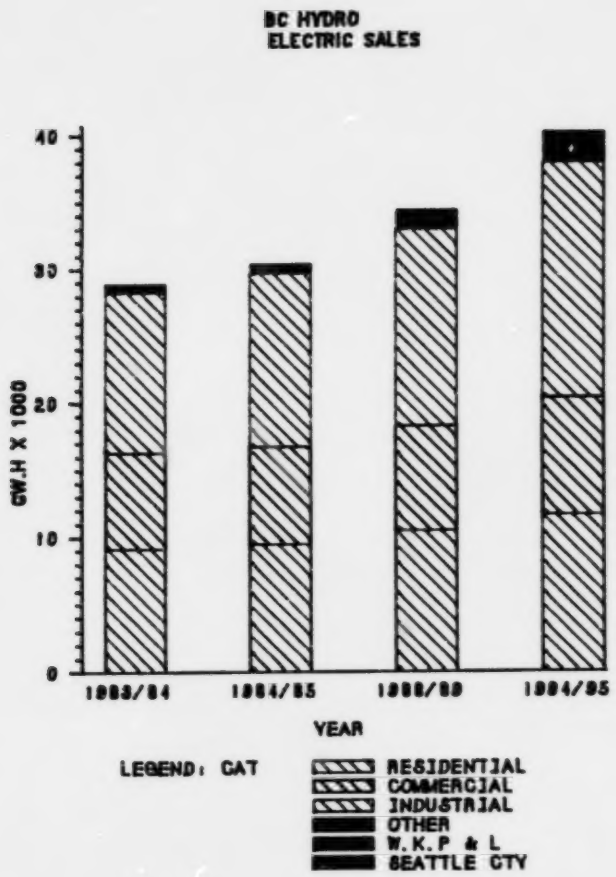


Table 6

B. C. HYDRO ELECTRIC SALES - 1994/95

Category[1]	Actual 1983/84 Sales (GW.h)	Increase in Sales 1983/84 to 1994/95 (GW.h)	1994/95 Sales (GW.h)	Average Annual Growth Rate 1983/84 to 1994/95 (%/yr)
Residential	9 005	2 520	11 525	2.3
Commercial	7 515	1 631	9 146	1.8
Industrial	11 938	5 578	17 516	3.5
Other[2]	253	119	372	3.6
Total Res, Comm, Ind & Other	28 711	9 848	38 559	2.7
WKP&L	9	1 031	1 040	-
Seattle City Light	-	318	318	-
Total Billed Sales	28 720	11 197	39 917	3.0
Losses & Accruals	3 825	1 298	5 123	-
Total Gross Requirements	32 545	12 495	45 040	3.0

[1] The industrial and commercial categories, which do not correspond to B. C. Hydro's rate categories, correspond to the goods and service producing sectors, respectively, contained in the Economic Forecasts section. A breakdown of the above industrial and commercial sales into B. C. Hydro Transmission and General Rate categories is presented in Tables 11, 12 and 13.

[2] Inter-utility transfers (excluding WKP&L) and firm export.

Table 7

B. C. HYDRO ELECTRIC SALES - INDUSTRIAL - 1994/95

Category	Actual 1983/84 Sales (GW.h)	Increase in Sales 1983/84 to 1994/95 (GW.h)	1994/95 Sales (GW.h)	Average Annual Growth Rate 1983/84 to 1994/95 (%/yr)
Paper & Allied Product Manufacturing	4 687	3 703	8 390	5.4
Wood Manufacturing	1 693	297	1 990	1.5
Chemical and Chemical Products Manufacturing	1 054	437	1 491	3.2
Metal Mines	2 330	125	2 455	0.5
Mineral Fuels	458	318	776	4.9
Construction	172	52	224	2.4
Other	1 544	646	2 190	3.2
Total	11 938	5 578	17 516	3.5

The additional requirements of the paper and allied product sector account for over 65% of the total increase in Industrial sales. The assessment of the resource base and market trends for this sector identified Thermo-Mechanical Pulping (TMP) and Chemi-Thermo-Mechanical Pulping (CTMP) as the processes best suited to utilize and upgrade British Columbia's remaining wood resource base. Whereas chemical pulp generally utilizes less than 50% of the wood fibre and requires both heat and mechanical energy, TMP and CTMP utilize over 90% and 80% respectively of the wood fibre and require mostly mechanical energy for grinding. The absence of wood wastes to fuel self-generation and the greater need for mechanical energy result in purchased electric energy requirements per tonne of TMP and CTMP being about five times those for chemical pulp.

Currently, six mills have mechanical pulp capacity. Of the 3 703 GW.h increase in sales to the pulp and paper sector, approximately 1 000 GW.h are required to bring these mills, and other existing mills, to full production. The remaining 2 700 GW.h of the increase is to serve four new greenfield CTMP mills and one or two integrated CTMP mills projected to be operating by the end of 1994/95, to meet the additional electric requirements resulting from the substitution of TMP for stone groundwood pulp in existing mills and for new capacity in fine papers, tissue and paperboard.

The wood manufacturing sector is projected to show only modest growth as harvesting approaches the allowable annual cut. Some expansion is projected for lumber production and certain panel products but this is offset in part by decreases in veneer and plywood production.

The output of the chemical industry in B. C. is closely linked to the pulp and paper industry it serves. Although the growing CTMP industry will require some chemicals, the quantities used will only be a small fraction of those used by the existing kraft mills. The disruption in B. C.'s pulp and paper industry in 1983/84, coupled with increased market share of B. C.'s competitors, substantially reduced the demands on the associated chemical industry. The sales of 1 054 GW.h in 1983/84 to the chemical industry compare with close to 1 500 GW.h in 1980/81 when the industry was operating at a more normal level. The forecast level for 1994/95 of 1 491 GW.h assumes normal operation of the pulp and paper industry and partial recovery of lost markets.

The slow growth in B. C.'s metal mining industry translates into only a modest increase in electricity sales between 1983/84 and 1994/95. Added load will come from bringing molybdenum production at Endako back to normal requiring 190 GW.h and increased copper production at Bethlehem/Valley Copper requiring roughly 410 GW.h. This growth will be largely offset by closures of existing mines as ore is depleted resulting in the total requirements for this sector increasing by only 125 GW.h by 1994/95.

The assessment of the mineral fuels sector indicates that there will be no major new coal mines during the forecast period and that existing mines are unlikely to operate at full capacity. The outlook is less optimistic than the 1983 forecast. The result is an additional load of just 100 GW.h between 1983/84 and 1994/95 for existing facilities and 65 GW.h to serve two new small high quality thermal coal mines with close proximity to existing transportation. The only other major new load in this sector is 150 GW.h for a Natural Gas Liquids (NGL) extraction plant.

The "other" category contained in Table 7 includes both other primary and manufacturing industries. Other primary industries comprise agriculture, forestry, fishing and non-metal mines, and accounted for 133 GW.h of the 1 544 GW.h load in 1983/84. The principal increase for this portion of the load is 70 GW.h for a new fluorspar operation. Other manufacturing industries include food and beverages, non-metallic mineral products (including cement, lime and fiberglass) and miscellaneous manufacturing and are forecast to increase at the same rates as the trade, construction and other manufacturing components of GDP. The total load of these three subsectors was 991 GW.h in 1983/84 and is forecast to reach 1 293 GW.h by 1994/95. The other major subsector, petroleum and coal products (largely oil refineries) is forecast to remain essentially flat at 324 GW.h until 1994/95 due to part of the B. C. petroleum product's market being served from Alberta. In addition to the above load, 200 GW.h of unspecified new load is also included in the forecast.

In addition to the Residential, Commercial and Industrial sectors, B. C. Hydro provides for firm exports and inter-utility transfers as shown in Table 6. These sales are forecast to increase at an average annual rate of 3.6% per annum from 253 GW.h in 1983/84 to 372 GW.h in 1994/95 and are largely to the City of New Westminster. The total sales to the four categories (Residential, Commercial, Industrial and Other) are forecast to grow at 2.7% per year compared to a ten-year historical growth rate of 3.8% per year.

Over the forecast period B. C. Hydro's sales to West Kootenay Power and Light (WKP&L) are forecast to increase from 9 GW.h in 1983/84 to 1 040 GW.h in 1994/95 and deliveries to Seattle City Light of 318 GW.h will commence in 1986. Prior to 1981/82, WKP&L had met its load from its own generating capacity and purchases from Cominco. Over the forecast period, B. C. Hydro will be supplying WKP&L's new loads and some of its existing load as Cominco utilizes more of its own generating facilities. The Seattle City Light load results from the agreement not to raise the Ross dam to avoid flooding the Skagit Valley.

As shown in Table 6, these new loads increase the projected rate of load growth for the 1983/84 to 1994/95 period from 2.7% per annum to 3.0% per annum.

The discussion to this point describes the basis of the probable forecast over the next 11 years. Actual electricity sales may vary either above or below this probable forecast as a result of:

(i) a higher or lower intensity of electrical use for the given economic/ demographic/price forecasts on which it is based; or

(ii) variations in these economic/demographic/price forecasts.

The likely impacts of these two phenomena on the forecast are discussed in the following sections.

3. INTENSITY OF ELECTRICAL USE - PROBABLE LOW AND PROBABLE HIGH ELECTRIC FORECASTS

Translating the probable economic, demographic, sectoral and energy price forecasts into an electric sales forecast involves a series of judgements with respect to how existing customers may change their electrical use and the timing and actual requirements of new customers. In order to reflect the uncertainty of these judgements, a band is developed around the probable electric forecast as shown in Figure 2.

The principal judgements, and thus the uncertainties, inherent in forecasting Residential sales are:

- the electricity requirements of new appliances that may come into use over the forecast period;

- the capture rate for electric heating which historically has varied significantly and often independently of the price relationship between electricity and competing fuel sources; and

- the number of people per household and the type of housing they choose.

Varying these factors within a range considered to be consistent with the probable economic and energy price forecasts results in a variation in Residential sales forecast for 1994/95 of about -640 to +600 GW.h.

The forecast for the Commercial category is influenced primarily by the electrical use per unit of floorspace in commercial and institutional buildings as more efficient lighting and more or less electrical equipment is installed.

Commercial sales could vary by ±600 GW.h in 1994/95 as a result of fairly small changes in the use per unit of floorspace in new and retrofitted buildings.

In recent years, the growth forecast for Industrial sales has turned out to be too high because new industrial projects have not been developed as quickly as their proponents had hoped and, in the short-term, much of the industrial capacity in the province has been operating well below full capacity. To arrive at a range around the probable industrial forecast, the level of capacity utilization is varied during the 1980's and thereafter the rate of investment in new energy-intensive loads is changed. In the probable low case, it is assumed for 1994/95 that the new CTMP mills in particular come in more slowly and that the new investment load is 1 215 GW.h less. In the probable high case, the load is increased by 1 230 GW.h which would allow an LNG project, or similar load, plus other smaller loads.

The Other category and the total WKP&L load are varied in proportion to the sum of Residential, Commercial and Industrial loads. In the probable low case, WKP&L would only need to purchase 810 GW.h from B. C. Hydro in 1994/95 whereas in the probable high case, they would need 1 410 GW.h. The sales to Seattle City Light are assumed to remain unchanged.

The resulting sensitivity range to the probable forecast is shown in Table 8.

Table 8

SENSITIVITY TO PROBABLE ELECTRIC FORECAST

	Probable Low 1994/95 Sales (GW.h)	Probable 1994/95 Sales (GW.h)	Probable High 1994/95 Sales (GW.h)
Residential	10 885	11 525	12 124
Commercial	8 547	9 146	9 756
Industrial	16 300	17 516	18 747
Other[1]	353	372	394
Total Res, Comm, Ind & Other	36 085	38 559	41 021
11 Year Growth Rate 1983/84 to 1994/95 (%/yr)	2.1	2.7	3.3
WKP&L	810	1 040	1 410
Seattle City Light	318	318	318
Total Billed Sales	37 213	39 917	42 749
Losses & Accruals	4 787	5 123	5 451
Total Gross Requirements	42 000	45 040	48 200
11 Year Growth Rate 1983/84 to 1994/95 (%/yr)	2.3	3.0	3.6

[1] "Other" includes inter-utility and Out of Province Firm.

4. EFFECTS OF CHANGES IN FORECAST ECONOMIC GROWTH - LOW AND HIGH ELECTRIC FORECASTS

The probable low and probable high electric forecasts developed above, and the probable electric forecast discussed prior to that, are based on probable economic growth of 2.8% per annum to 1994 and associated population growth of 1.8% per annum for the same period. The low forecast for economic growth to 1994, discussed briefly in the economics section of this report, is 1.7% per annum with a corresponding population growth rate of 1.4% per annum and the high forecast for economic growth is 4.1% with population at 2.0% per annum.

Estimates of future electricity sales corresponding to the low economic outlook are prepared for each rate category as follows:

Residential - based on the low population growth and lower rates of household formation and appliance requirements to reflect lower income and lower capture rates for electric heat;

Commercial - based mainly on lower real GDP and population growth forecasts, along with the lower floorspace consumption levels;

Industrial - estimated by relating the low to the probable goods producing sectoral GDP's. In the first few years additional adjustments are made to reflect a possible low scenario for utilization of existing industrial capacity; and

WKP&L - reduced in proportion to the other loads.

This approach results in a low total requirements forecast of 39 000 GW.h in 1994/95, 13.5% below the probable. Applying the same approach to arrive at a high forecast results in requirements of 51 500 GW.h in 1994/95, 14% above the probable.

5. TABULATIONS

The following six tables present the electric forecast on a year-to-year basis and details of the basis of each component of the forecast. Table 9 presents the probable forecast, and range of forecasts, for the total B. C. Hydro system; Table 10 presents the details of the residential forecast; Tables 11 and 12 present sales to the Commercial and Industrial customers and the breakdown of their sales to B. C. Hydro's General and Transmission Rate categories; Table 13 presents the electric sales forecast by B. C. Hydro's rate categories; and Table 14 presents the load on the integrated system and a comparison with the 1983 forecast.

Table 9

B. C. HYDRO
ELECTRIC GROSS LOAD REQUIREMENTS FORECAST
TOTAL B. C. HYDRO

Fiscal Year	July 1984 Forecast										July 1983 Forecast	
	Low		Range of Probable Forecasts: Probable Low		Probable		Probable High		High		Probable	
	Peak (MW)	Energy (GW.h)	Peak (MW)	Energy (GW.h)	Peak (MW)	Energy (GW.h)	Peak (MW)	Energy (GW.h)	Peak (MW)	Energy (GW.h)	Peak (MW)	Energy (GW.h)
1982/83 (Actual)	5 537	31 513	5 537	31 513	5 537	31 513	5 537	31 513	5 537	31 513	5 537	31 513
1983/84 (Actual)	6 246	32 545	6 246	32 545	6 246	32 545	6 246	32 545	6 246	32 545	6 246	32 545
FORECAST												
1984/85	5 860	32 600	5 950	33 100	6 140	34 150	6 260	34 800	6 420	35 700	6 400	35 620
1985/86	5 980	33 400	6 100	34 100	6 310	35 290	6 420	35 900	6 600	36 900	6 900	37 540
1986/87	6 300	34 500	6 480	35 500	6 720	36 780	6 870	37 600	7 050	38 600	7 120	38 890
1987/88	6 390	35 000	6 610	36 200	6 830	37 420	7 010	38 400	7 270	39 800	7 260	39 650
1988/89	6 480	35 600	6 740	37 000	7 020	38 570	7 250	39 800	7 500	41 200	7 500	41 050
1989/90	6 630	36 600	6 920	38 200	7 300	40 290	7 590	41 900	7 780	43 500	7 700	42 190
1990/91	6 730	37 100	7 080	39 000	7 510	41 360	7 800	43 000	8 150	44 900	7 910	43 410
1991/92	6 850	37 800	7 270	40 100	7 730	42 660	8 100	44 700	8 500	46 900	8 150	44 870
1992/93	6 920	38 200	7 410	40 900	7 890	43 550	8 320	45 900	8 810	48 600	8 430	46 550
1993/94	7 010	38 600	7 510	41 400	8 030	44 240	8 530	47 000	9 070	50 000	8 710	48 200
1994/95	7 080	39 000	7 620	42 000	8 170	45 040	8 750	48 200	9 350	51 500	8 960	49 500
Avg Ann Growth: % 11 Yrs: 83/84-94/95	1.1	1.7	1.8	2.3	2.5	3.0	3.1	3.6	3.7	4.3	3.3	3.9

The basis for the probable forecast is presented in Tables 10 through 13. The low, probable low, probable high and high electrical forecasts are calculated as follows:

Residential

- the probable low and probable high forecasts result from changes in the rate of household formation, electricity capture rate in space heating and increases in 'other' electricity use. The changes cause a variation from -640 to +600 GW.h in 1994/95, or 5% of the probable estimate.

- the low and high forecasts result from applying the respective population forecasts to the changes incorporated in the probable-low and probable-high forecasts. The changes cause an additional variation of 300 GW.h in 1994/95, or an additional 2.6% from the probable forecast.

Commercial

- the probable low and probable high forecasts result mainly from changes in electrical use per unit of floorspace. The changes cause a variation of ±600 GW.h in 1994/95, or 7% of the probable estimate.

- the low and high forecasts result from applying the respective GDP and population forecasts. The changes cause an additional variation from -430 to +920 GW.h in 1994/95, or a change from -5% to +11% of the probable estimate.

Industrial

- the probable low and probable high forecasts result from production curtailments or higher operating capacities in the short-term, and somewhat slower or faster investment in electric intensive industries in the longer-term. The changes in each case cause a variation of just over 1 200 GW.h in 1994/95, or 7% of the probable estimate.

- the low and high forecasts result from extensive production curtailments or considerably higher operating capacities in the short-term, and by relating the low and high to the probable goods producing GDP's in the longer-term. The changes cause an additional variation of 1 565 GW.h for the low and 1 260 GW.h for the high or 9% to 7% of the probable estimate.

Other

For each forecast, the 'other' load is varied in proportion to the sum of the Residential, Commercial and Industrial loads.

WKP&L

For each forecast, the WKP&L and Cominco total load is varied in proportion to the sum of the Residential, Commercial and Industrial loads. Local generation is deducted from the total requirements, and the residual is assumed to be supplied by B. C. Hydro.

Table 10

RESIDENTIAL ELECTRIC SALES FORECAST
(Billed Basis, No Adjustment For Accrual)

Fiscal Year	Average Residential[a] Accounts (000)	Percent[b] Electric Heating (%)	Annual Average Use Per Account:[c] Non Electric Heating (kW.h)	Electric Heating (kW.h)	All Accounts (kW.h)	Total[d] Sales (GW.h)
1982/83 (Actual)	957.2	15.4	8 127	15 211	9 216	8 821
1983/84 (Actual)	978.9	16.4	8 151	14 559	9 199	9 005
Avg Ann Growth: % 10 Yrs: 73/74-83/84	3.7	-	1.6	-2.5	2.0	5.7
FORECAST						
1984/85	1 000.1	16.9	8 144	15 135	9 326	9 327
1985/86	1 023.4	17.6	8 141	14 953	9 341	9 560
1986/87	1 051.1	18.3	8 121	14 707	9 329	9 805
1987/88	1 079.2	18.9	8 109	14 489	9 313	10 051
1988/89	1 108.5	19.4	8 098	14 284	9 296	10 305
1989/90	1 138.1	19.8	8 084	14 088	9 274	10 554
1990/91	1 167.8	20.2	8 053	13 888	9 234	10 784
1991/92	1 197.0	20.6	8 004	13 681	9 176	10 984
1992/93	1 226.3	21.0	7 937	13 464	9 098	11 157
1993/94	1 256.0	21.4	7 872	13 256	9 022	11 332
1994/95	1 286.8	21.7	7 818	13 061	8 956	11 525
Avg Ann Growth: % 11 yrs: 83/84-94/95	2.5	-	-0.4	-1.0	-0.2	2.3

[a] Developed from the population forecast by applying headship rates and factors to distribute households by type of dwelling. In 1983/84, the B. C. Hydro household dwelling mix was 64% houses, 3% row houses, 23% apartments, 5% mobile, and 5% seasonal. In 1994/95, the mix is forecast to be 60%, 6%, 24%, 5% and 5%, respectively.

[b] The relative costs of gas and electric space heating have been calculated historically based on average residential rates. From the historic relation between relative price and actual capture rates, the 1984/85 capture rates for electric space heating have been estimated to be 16% for single family dwellings, 60% for row housing and 55% for apartments (excluding Vancouver Island). Although gas prices are forecast to increase slightly in relation to electricity, gas furnace efficiencies are projected to improve and, as a result, the capture rates for electric heating are projected to remain relatively constant over the forecast period. The overall average, with gas becoming available on Vancouver Island in 1987/88, is 39% between 1983/84 and 1994/95.

[c] The electricity use for non-electrically heated households is a function of the projections of the numbers of appliances per household and the use per appliance. During the forecast period households are projected to have greater numbers of appliances but because they are more efficient the use per household does not increase. The decline in use for electrically heated households results from a greater proportion of row houses and apartments, as well as from higher insulation levels in new dwellings and other conservation efforts.

[d] The total sales have been projected taking into account anticipated effects of conservation. Without this conservation the 1994/95 residential sales would be 970 GW.h higher. These savings result in part from the gradual replacement of old appliances with new ones currently available and the growing proportion of houses that are and will be built to current insulations standards. These changes in use, which result in part from past price increases and will tend to proceed without future price increases, account for 220 GW.h of the conservation in 1994/95. The greater part of the conservation, 750 GW.h in 1994/95, result from future improvements beyond today's standards and tend to be related to future price changes in B. C. and elsewhere.

Table 11

COMMERCIAL ELECTRIC SALES FORECAST
(Billed Basis, No Adjustment For Accrual)

Fiscal Year	By Standard Industrial Classification (SIC)							By Rate Category		
	Transportation Communication & Other Utilities[a] (GW.h)	Wholesale & Retail Trade[b] (GW.h)	Finance, Insurance & Real Estate[c] (GW.h)	Community, Business & Pers. Serv.[d] (GW.h)	Public Admin. & Defence[e] (GW.h)	Unclassified[f] (GW.h)	Total[h] (GW.h)	General (GW.h)	Trans Rate (GW.h)	Other[g] (GW.h)
1982/83 (Actual)	958	1 792	1 210	2 253	502	544	7 359	6 765	220	374
1983/84 (Actual)	959	1 771	1 184	2 342	510	749	7 515	6 888	267	360
FORECAST										
1984/85	1 028	1 781	1 202	2 395	510	766	7 682	7 001	315	366
1985/86	1 046	1 808	1 214	2 441	515	778	7 802	7 108	320	374
1986/87	1 074	1 856	1 238	2 489	523	795	7 975	7 263	330	382
1987/88	1 115	1 853	1 263	2 519	534	806	8 090	7 355	345	390
1988/89	1 152	1 847	1 289	2 546	548	817	8 199	7 445	355	399
1989/90	1 181	1 874	1 317	2 598	560	833	8 363	7 591	365	407
1990/91	1 212	1 901	1 346	2 645	570	850	8 524	7 740	370	414
1991/92	1 236	1 928	1 373	2 697	579	865	8 678	7 881	375	422
1992/93	1 266	1 955	1 402	2 744	595	881	8 843	8 027	385	431
1993/94	1 291	1 982	1 429	2 795	604	897	8 998	8 168	390	440
1994/95	1 315	2 009	1 456	2 841	613	912	9 146	8 307	390	449
Avg Ann Growth: % 11 Yrs: 83/84-94/95	2.9	1.2	1.9	1.8	1.7	1.8	1.8	1.7	3.5	2.0

[a] Growth in this category reflects the anticipated build up of operations at Westshore and Ridley coal terminals. As well Trans Mountain Pipeline at Kamloops is building up to capacity and an allowance is included for the pumping requirements of the Vancouver Island Gas Pipeline project. The base load is expected to grow at a level consistent with the sectoral GDP.

[b] The wholesale and retail trade forecast is based on projections of increased floorspace as developed from GDP and retail sales estimates, combined with anticipated reductions in the energy use per square meter that are expected as a result of conservation improvements.

[c] Most of the sales in this category are linked to projections of increased floorspace requirements and the corresponding reductions in energy use per square meter of floorspace. Particularly in the office space component it is now anticipated that the electricity use will decline whereas it was previously projected that office automation would substantially increase the use per square meter.

[d] Two major components of this category are health and education which are projected based on population estimates, and food and accommodation which are forecast based on projections of the tourist industry.

[e] Growth is based on projections of the government sectoral GDP.

[f] Unclassified includes the portion of non-residential energy sales within B. C. Hydro that has not yet been coded. It has been assumed that the growth of the services in this sector will be the same as the average growth of all the other commercial sectors.

[g] The "Other" rate category includes Irrigation, Street Lighting, and B. C. Hydro Use.

[h] Approximately 50% of the total sales relate to categories in which energy conservation effects have been explicitly estimated. Without this conservation the 1994/95 commercial sales would be 270 GW.h higher. Of the anticipated reduction in use, 100 GW.h relate to future improvements while 170 GW.h relate to the incorporation of existing standards and practices.

Table 12

INDUSTRIAL ELECTRIC SALES FORECAST
(Billed Basis, No Adjustment For Accrual)

Fiscal Year	By Standard Industrial Classification (SIC)									By Rate Category	
	Primary Industries			Manufacturing				Construction[h]			
	Metal Mines[a] (GW.h)	Mineral Fuel[b] (GW.h)	Other[c] (GW.h)	Wood[d] (GW.h)	Paper & Allied[e] (GW.h)	Chemical & Chem. Products[f] (GW.h)	Other[g] (GW.h)	(GW.h)	Total (GW.h)	General (GW.h)	Trans Rate (GW.h)
1982/83 (Actual)	2 394	337	131	1 523	4 618	1 096	1 470	196	11 765	2 939	8 826
1983/84 (Actual)	2 330	458	133	1 693	4 687	1 054	1 411	172	11 938	2 941	8 997
FORECAST											
1984/85	2 326	511	136	1 682	5 485	1 169	1 387	176	12 872	2 892	9 980
1985/86	2 556	522	139	1 677	5 588	1 192	1 440	183	13 297	2 907	10 390
1986/87	2 735	622	144	1 724	5 841	1 254	1 477	188	13 985	2 995	10 990
1987/88	2 762	643	149	1 699	5 888	1 301	1 514	194	14 150	3 025	11 125
1988/89	2 679	663	151	1 682	6 421	1 324	1 545	199	14 664	3 044	11 620
1989/90	2 709	679	153	1 663	7 304	1 426	1 573	203	15 710	3 060	12 650
1990/91	2 709	754	227	1 766	7 377	1 383	1 607	207	16 030	3 205	12 825
1991/92	3 040	755	231	1 800	7 630	1 410	1 641	211	16 718	3 288	13 430
1992/93	3 040	760	237	1 850	7 883	1 437	1 674	216	17 097	3 382	13 715
1993/94	2 695	776	241	1 934	8 137	1 464	1 808	220	17 275	3 505	13 770
1994/95	2 455	776	246	1 990	8 390	1 491	1 944	224	17 516	3 606	13 910
Avg Ann Growth: % 11 Yrs: 83/84-94/95	0.5	4.9	5.7	1.5	5.4	3.2	3.0	2.4	3.5	1.9	4.0

[a] The small increase of 125 GW.h in 1994/95 over 1983/84 is largely a result of 190 GW.h for bringing existing molybdenum production at Endako back to normal production, 410 GW.h for increased production at Bethlehem/Valley Copper, 480 GW.h decrease as existing mines begin to close in the 1990's because of ore depletion. In 1994/95, 90% of the electricity consumption is in copper mines and 8% in molybdenum mines.

[b] Of the 320 GW.h increase projected by 1994/95, 100 GW.h is for existing coal mines to utilize existing capacity, 65 GW.h is for two new high quality thermal coal mines located close to transportation (Quinsam and Telkwa), 150 GW.h is for a Natural Gas Liquids (NGL) extraction facility projected to start operation in 1986. Considerable excess coking coal capacity is projected to still exist in 1994/95. The coal mining electricity requirements by Region in 1994/95 are projected as 365 GW.h for the Southeast and 170 GW.h for the Northeast.

[c] The remaining Primary Industries consist of Agriculture, Forestry, Fishing, Non-metal mines, Quarries and Sand Pits. Of the 113 GW.h increase projected by 1994/95, 70 GW.h is for a new fluorspar operation expected to commence in 1990.

[d] The 300 GW.h increase in 1994/95 over 1983/84 is a combination of 240 GW.h for increased lumber production largely from existing facilities, 90 GW.h for increased production of other panel products, a moderate decrease in production of veneer, plywood, shingles and shakes.

[e] The 3 700 GW.h increase in purchased electricity in 1994/95 over 1983/84 is accompanied by an estimated increase of 600 GW.h in co-generation. The total increase of 4 300 GW.h comes about from an additional 750 GW.h for increased chemical pulp production from largely existing capacity, 500 GW.h less for stone groundwood pulp, 1 300 GW.h more for Thermo-Mechanical Pulp (TMP) from higher utilization of existing capacity and from new capacity replacing stone groundwood, 1 900 GW.h for new bleached Chemi-Thermo-Mechanical Pulp (CTMP), 150 GW.h more for increased printing paper capacity, 650 GW.h more for increased production of fine papers, tissue and paperboard. The large increases in electricity requirements for TMP and CTMP reflect the fact that mechanical pulp is approximately three times as electric intensive as chemical pulp. In addition there is no justification for installing co-generation with mechanical pulping.

[f] The moderate growth reflects increased production from existing capacity in line with the increased production of chemical pulp expected and partial recovery of historical markets.

[g] Other manufacturing consists mainly of food and beverage - moderate growth projected, primary metal - no major smelting loads now projected until after 1994/95, non-metallic mineral products - cement and fibreglass the main loads with no major increases projected, petroleum and coal products - refineries are the main load and growth is projected to be negative initially and flat by 1994/95, miscellaneous and non-specified - some moderate growth and new loads expected.

[h] Construction is not expected to grow significantly.

Table 13

B. C. HYDRO HISTORICAL AND PROBABLE ELECTRIC FORECAST BY SALES CATEGORIES
(Billed Basis, No Adjustment For Accrual)

Fiscal Year	Residential (GW.h)	General (GW.h)	Trans Rate (GW.h)	Other[a] (GW.h)	Total Res, Gen, Trans, & Other (GW.h)	WKP&L (GW.h)	Seattle City Light (GW.h)	Total Billed Sales (GW.h)	Losses & Accruals (GW.h)	Total Gross Requirements (GW.h)	Peak (MW)
HISTORICAL											
1973/74	5 176	6 378	7 776	470	19 800			19 800	2 656	22 456	3 739
1974/75	5 685	6 685	7 714	495	20 579			20 579	2 815	23 394	3 957
1975/76	6 258	7 062	6 808[b]	532	20 660			20 660	2 878	23 538	4 232
1976/77	6 625	7 592	8 166	541	22 924			22 924	3 072	25 996	4 421
1977/78	7 051	8 073	8 479	561	24 164			24 164	3 372	27 536	4 800
1978/79	7 492	8 512	9 133	583	25 720			25 720	3 628	29 348	5 122
1979/80	7 727	8 949	9 217	625	26 518			26 518	3 455	29 973	5 231
1980/81	8 042	9 344	9 597	581	27 564			27 564	3 594	31 158	5 511
1981/82	8 640	9 706	9 339[b]	609	28 294	14		28 308	4 051	32 359	5 939
1982/83	8 821	9 704	9 046	620	28 191	15		28 206	3 307	31 513	5 537
1983/84	9 005	9 829	9 264[b,c]	613	28 711	9		28 720	3 825	32 545	6 246
Avg Ann Growth: % 10 Yrs: 73/74-83/84	5.7	4.4	1.8	2.7	3.8	-		3.8	-	3.8	5.3
FORECAST											
1984/85	9 327	9 893	10 295	622	30 137	30		30 167	3 983	34 150	6 140
1985/86	9 560	10 015	10 710	636	30 921	135	136	31 192	4 098	35 290	6 310
1986/87	9 805	10 258	11 320	654	32 037	180	318	32 535	4 245	36 780	6 720
1987/88	10 051	10 380	11 470	673	32 574	205	318	33 097	4 323	37 420	6 830
1988/89	10 305	10 489	11 975	694	33 463	350	318	34 131	4 439	38 570	7 020
1989/90	10 554	10 651	13 015	714	34 934	440	318	35 692	4 598	40 290	7 300
1990/91	10 784	10 945	13 195	736	35 660	665	318	36 643	4 717	41 360	7 510
1991/92	10 984	11 169	13 805	756	36 714	780	318	37 812	4 848	42 660	7 730
1992/93	11 157	11 409	14 100	778	37 444	840	318	38 602	4 948	43 550	7 890
1993/94	11 332	11 673	14 160	801	37 966	920	318	39 204	5 036	44 240	8 030
1994/95	11 525	11 913	14 300	821	38 559	1 040	318	39 917	5 123	45 040[d]	8 170
Avg Ann Growth: % 11 Yrs: 83/84-94/95	2.3	1.8	4.0	2.7	2.7	-	-	3.0	-	3.0	2.5

[a] "Other" includes Irrigation, Street Lighting, B. C. Hydro Use, Inter-Utility and Out of Province Firm.

[b] There were forestry industry strikes/lockouts in 1975/76, 1981/82 and 1983/84 causing reductions in Transmission Rate sales.

[c] Includes 190 GW.h Block Recovery (Rate 1843).

[d] The 1994/95 electricity requirements in this forecast have slipped almost 3 years relative to the July 1983 Probable Forecast.

Table 14

B. C. HYDRO ELECTRIC GROSS LOAD REQUIREMENTS FORECAST
INTEGRATED SYSTEM

Fiscal Year	July 1984 Forecast										July 1983 Forecast	
	Low		Range of Probable Forecasts						High		Probable	
			Probable Low		Probable		Probable High					
	Peak (MW)	Energy (GW.h)	Peak (MW)	Energy (GW.h)	Peak (MW)	Energy (GW.h)	Peak (MW)	Energy (GW.h)	Peak (MW)	Energy (GW.h)	Peak (MW)	Energy (GW.h)
1982/83 (Actual)	5 508	31 354	5 508	31 354	5 508	31 354	5 508	31 354	5 508	31 354	5 508	31 354
1983/84 (Actual)	6 215	32 387	6 215	32 387	6 215	32 387	6 215	32 387	6 215	32 387	6 215	32 387
FORECAST												
1984/85	5 830	32 440	5 920	32 935	6 100	33 980	6 220	34 625	6 380	35 520	6 360	35 455
1985/86	5 950	33 235	6 060	33 930	6 270	35 115	6 380	35 720	6 560	36 715	6 860	37 370
1986/87	6 260	34 330	6 440	35 325	6 680	36 600	6 830	37 415	7 010	38 410	7 070	38 715
1987/88	6 350	34 830	6 570	36 025	6 790	37 235	6 970	38 210	7 230	39 605	7 220	39 470
1988/89	6 440	35 425	6 700	36 820	6 980	38 380	7 210	39 605	7 460	41 000	7 460	40 860
1989/90	6 590	36 425	6 880	38 015	7 260	40 095	7 550	41 700	7 740	43 290	7 660	41 990
1990/91	6 690	36 920	7 040	38 810	7 470	41 160	7 760	42 795	8 10u	44 685	7 860	43 200
1991/92	6 810	37 620	7 230	39 905	7 690	42 455	8 050	44 485	8 450	46 675	8 100	44 650
1992/93	6 880	38 015	7 370	40 700	7 840	43 340	8 270	45 680	8 760	48 365	8 380	46 320
1993/94	6 970	38 410	7 470	41 195	7 980	44 025	8 480	46 770	9 020	49 755	8 660	47 960
1994/95	7 040	38 810	7 580	41 795	8 120	44 820	8 700	47 965	9 300	51 250	8 910	49 200
Avg Ann Growth: % 11 Yrs: 83/84-94/95	1.1	1.7	1.8	2.3	2.5	3.0	3.1	3.6	3.7	4.3	3.3	3.9

GAS FORECASTS

IV. GAS SERVICE

1. BASIS OF FORECASTS

The 1984 natural gas load forecast generally follows the methodology of the electric load forecast. The integration of forecast methodologies commenced in 1983 and has been substantially expanded in 1984. As described in the electric service section, the top down/end use forecasting approach is used. Disaggregation of natural gas load data into Standard Industrial Classification (SIC) codes has allowed more detailed linkage between load growth and economic parameters than was possible in previous years. Large natural gas loads subject to potentially major changes have been assessed individually.

2. PROBABLE FORECAST

The principal components of the 1984 probable natural gas forecast are shown in Figure 7 and Table 15. The forecasts are presented in terms of Commercial and Industrial loads based on the SIC coding and in terms of B. C. Hydro's General and Interruptible rate categories.

The forecast growth rate for Residential sales of 1.5% per annum is about 80% of the growth rate in 1983 forecast. This reduction is due largely to lower population and household growth forecast for the Lower Mainland. Conversions from oil heating to natural gas, which are forecast to be substantially complete by 1989/90, explain 40% of the increase in total residential accounts during the 1983/84 to 1989/90 period. Natural gas capture rates are similar to last year's estimates whereas use rates per house are slightly lower in this year's forecast. Use rates are derived from assessing the impact of conservation, housing mix and new furnace efficiency. The details of the Residential forecast and the annual data to 1994/95 are presented in Table 17.

The previous forecast methodology estimated both total general and interruptible sales as a function of several economic and judgmental factors. By application of Standard Industrial Classification (SIC) codes to billing information, most of the general and interruptible load has been disaggregated to 26 SIC categories which, in turn, have been classified into commercial and industrial groups. Each load identified by SIC category is forecast as a function of appropriate independent variables or by direct knowledge of specific plant activity.

The commercial natural gas sales forecast is presented in Table 18. The commercial sales group includes business activity, such as retail trade and accommodation; community activities, such as education and health services; and apartments and row housing which are centrally heated (and which are not part of the SIC categories). The commercial group load growth fluctuates by category with the business and community load growth exceeding the apartment and row housing load growth.

Figure 7

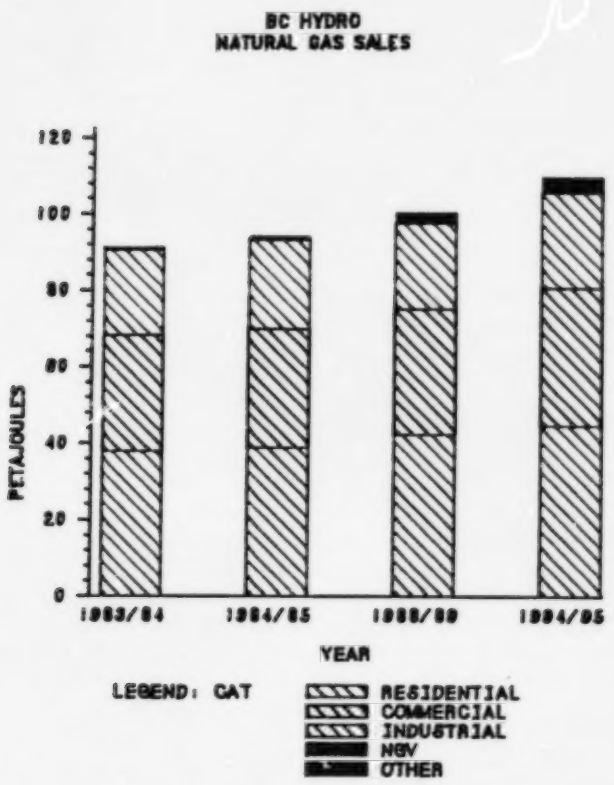


Table 15

B. C. HYDRO NATURAL GAS SALES - 1994/95

Category	Normal 1983/84 Sales (TJ)	Increase in Sales 1983/84 to 1994/95 (TJ)	Normal 1994/95 Sales (TJ)	Average Growth 1983/84 to 1994/95 (%/yr)
Residential	37 402	6 715	44 117	1.5
Commercial	30 367	5 668	36 035	1.6
Industrial	22 434	2 381	24 815	0.9
NGV	134	3 226	3 360	34.0
Other	196	34	230	1.5
Total Sales	90 533	18 024	108 557	1.7
of which:				
General	33 678	10 233	43 911	2.4
Interruptible	19 123	(2 184)	16 939	(1.1)

The industrial sales group includes several manufacturing activities, agriculture and a small mining component. Load growth fluctuates by category (as shown in Table 19) but the major changes in load result from:

- fuel switching at cement manufacturing facilities which causes substantial loss of gas load;

- lower capacity utilization and natural gas consumption at crude oil refineries due to transfers of refined petroleum products from Alberta refineries through Trans Mountain Pipeline; and

- strong growth in natural gas sales to the paper and allied products category due to B. C. forest industry shifting to more valued-added products.

The impact of the load reductions at cement and refinery facilities causes a low total load growth for the industrial sector during the period to 1994/95.

Natural Gas for Vehicles (NGV) load has the potential to grow at widely different rates. Three cases for NGV load growth have been prepared. The probable case shown in Table 15 relies on a successful marketing effort in the Lower Mainland. The forecast load growth for NGV to 1989/90 includes capturing most of the Metro Vancouver taxi fleets, 40 public service stations, and penetration of B. C. Ferries and diesel truck fleet markets.

Other natural gas sales are to B. C. Hydro's own facilities and seasonal loads. Most of the load growth occurs in the seasonal component as B. C. Hydro use remains static.

Interruptible sales are estimated on the basis of historical trends and expected future developments, including reduced load at cement plants, refineries and the GVRD facility where garbage will be used as fuel to displace natural gas. Since the early 1970's, interruptible sales have fluctuated significantly. They reached a peak in 1979/80 and have been declining since then. With the loss of load estimated in the 1984 forecast, future interruptible sales continue to decline until after 1992/93 when a slow upturn starts as fuel switching is complete.

General sales are calculated as the residual of the sum of commercial and industrial sales less interruptible sales. Total commercial and industrial sales growth is modest while growth in general sales is somewhat higher at 2.4%. This is due to the lack of growth in interruptible sales.

As shown in Table 20, total sales of natural gas in the Lower Mainland increase at 1.7% per year to 1994/95. This is substantially lower than the 1983 load forecast growth rate of about 2.9% per year. The reduction is essentially explained by two factors:

- the loss of load at cement plants and crude oil refineries. Without these two load categories, the remaining load grows at 2.0% per year to 1994/95; and

- the 1984 forecast of B. C. economic growth is about two-thirds the 1983 forecast growth rate through to 1994/95.

Table 16

B. C. HYDRO NATURAL GAS AND L.P. GAS SALES FORECAST
LOWER MAINLAND - VANCOUVER ISLAND

(Lower Mainland Forecast Includes NGV)

(TJ)[a, b]

	July 1984 Forecast						July 1983 Forecast	
	Low		Probable		High		Probable	
	Lower Mainland Natural Gas	Vancouver Island L.P. Gas[f]	Lower Mainland Natural Gas	Vancouver Island L.P. Gas[f]	Lower Mainland Natural Gas	Vancouver Island L.P. Gas[f]	Lower Mainland Natural Gas	Vancouver Island L.P. Gas[f]
1983/84 (Actual)	86 720	312	86 720	312	86 720	312		312[e]
(Actual Normalized)[c]	90 533		90 533		90 533		90 533[e]	
FORECAST								
1984/85	91 819	401	93 284	401	93 342	401	95 711	401
1985/86	92 295	401	94 573	401	96 117	401	98 554	401
1986/87	91 822	401	95 198	401	98 586	401	101 200	401
1987/88	92 498	401	97 202	401	102 403	401	104 299	401
1988/89	92 686	401	99 290	401	105 586	401	107 514	401
1989/90	93 272	401	101 135	401	109 181	401	110 258	401
1990/91	93 515	401	102 592	401	111 761	401	113 223	401
1991/92	94 190	401	104 006	401	114 831	401	115 839	401
1992/93	94 638	401	105 422	401	117 925	401	118 822	401
1993/94	95 431	401	106 978	401	121 061	401	121 915	401
1994/95	95 771	401	108 557	401	124 211	401	125 044	401
Avg Ann Growth: % (Normalized Base) 11 Yrs: 83/84-94/95	0.5	-	1.7	-	2.9	-	3.0	-

NOTES:

[a] TJ = 10^{12} Joules.

[b] Imperial to metric conversion for information: 1 BTU = 1 054.6 Joules.

[c] Normalized for weather and normal 30 day curtailment of interruptible sales.

[d] In 1994/95 the NGV load is expected to make up 3.1% of the total load.

[e] The 1983 projection for fiscal year 1983/84 was 92 110 TJ for the Lower Mainland and 401 TJ for Vancouver Island.

[f] The load forecast for Vancouver Island assumed that no underwater pipeline will be built between it and the Lower Mainland.

Table 17

RESIDENTIAL NATURAL GAS SALES FORECAST
(Billed Basis, No Adjustment For Accrual)
(TJ)

Fiscal Year	Residential Average Accounts[a,b]			Residential Sales		
	With Heat[b]	Without Heat	Total	With Heat	Without Heat	Total
1982/83 (Actual)	286 639	9 808	296 447	36 232	690	36 922
1983/84 (Actual)	297 338	9 453	306 791	36 806	596	37 402
FORECAST						
1984/85	307 400	9 155	316 555	37 910	580	38 490
1985/86	318 550	8 850	327 400	39 110	564	39 674
1986/87	330 000	8 550	338 550	39 950	548	40 498
1987/88	340 700	8 250	348 950	40 740	533	41 273
1988/89	349 850	7 950	357 800	41 310	517	41 827
1989/90	358 200	7 650	365 850	41 780	500	42 280
1990/91	365 700	7 375	373 075	42 100	483	42 583
1991/92	372 500	7 125	379 625	42 400	467	42 867
1992/93	379 000	6 875	385 875	42 720	451	43 171
1993/94	385 450	6 625	392 075	43 180	434	43 614
1994/95	392 050	6 375	398 425	43 700	417	44 117
Avg Ann Growth: % 11 Yrs: 83/84-94/95	2.5	(3.5)	2.4	1.6	(3.2)	1.5

[a] Developed from provincial population projection, Lower Mainland share of population, headship rates, distribution of housing by type of dwelling, identification of gas service area.

[b] The capture rate varies by type of dwelling. The 1983/84 natural gas capture rates for new dwellings in the natural gas service area of the Lower Mainland are as follows: single 95.8%, row 45.7% and apartment 42.8%. In 1994/95 the capture rates are single 96.2%, row 48.0% and apartment 57.0%.

Table 18

COMMERCIAL NATURAL GAS SALES FORECAST
(Billed Basis, No Adjustment For Accrual)
(TJ)

Fiscal Year	By Standard Industrial Classification (SIC)[a]							
	Transportation Communication & Other Utilities	Wholesale & Retail Trade	Finance, Insurance & Real Estate	Community Business & Pers. Serv.[b]	Public Admin. & Defence	Unclassified[c]	Apartments & Row Housing[d]	Total
1983/84 (Actual)	2 088	2 578	3 112	10 012	901	2 893	8 783	30 367
FORECAST								
1984/85	2 125	2 611	3 170	10 169	883	2 942	8 907	30 807
1985/86	2 164	2 670	3 194	10 323	883	2 992	9 032	31 258
1986/87	2 212	2 753	3 235	10 494	892	3 043	9 159	31 788
1987/88	2 284	2 753	3 311	10 641	908	3 095	9 281	32 273
1988/89	2 358	2 753	3 398	10 789	921	3 147	9 405	32 771
1989/90	2 405	2 801	3 480	10 973	931	3 201	9 530	33 321
1990/91	2 453	2 850	3 566	11 161	940	3 255	9 640	33 865
1991/92	2 501	2 900	3 651	11 348	949	3 311	9 744	34 404
1992/93	2 549	2 949	3 735	11 536	958	3 367	9 852	34 946
1993/94	2 597	2 998	3 821	11 723	968	3 424	9 958	35 489
1994/95	2 645	3 047	3 906	11 911	977	3 482	10 067	36 035
Avg Ann Growth: % 11 Yrs: 83/84-94/95	2.2	1.5	2.1	1.6	0.7	1.7	1.2	1.6

[a] Standard Industrial Classification disaggregation of general and interruptible natural gas load is available for 1983/84. Each category is forecast by an independent variable (noted in brackets): transportation, communication and other utilities (transportation and utilities GDP), wholesale and retail trade (retail floorspace), finance, insurance and real estate (office floorspace), community, business and personal service (population components, economic parameters), public administration and defence (government GDP), and unclassified (average of all SIC categories growth).

[b] Includes several categories (with 1983/84 classified natural gas load in brackets): education (2 885.8 TJ), health and welfare (2 406.2 TJ), accommodation and food (2 483.6 TJ), amusement and recreation (657.4 TJ), personal services (517.3 TJ) and others (1 061.7 TJ).

[c] Part of the general load is not classified by SIC category. It is increased at the average rate of increase of the classified loads.

[d] A total of 131 500 apartments and 1 260 row housing units are centrally heated and are classified as commercial load. The number of apartments and row houses are determined in the demographic model which includes population and housing components. The average unit use rate is determined by examining several factors including energy price, conservation and furnace efficiency.

Table 19

INDUSTRIAL NATURAL GAS SALES FORECAST
(Billed Basis, No Adjustment For Accrual)
(TJ)

Fiscal Year	By Standard Industrial Classification (SIC)[a] By SIC Category										
	Construction[b]	Non-Metal Minerals[c]	Petro. & Coal[c]	Food & Beverage[b]	Paper & Allied[b]	Wood Manuf.[b]	Chemical & Chem. Prod.[b]	Metal Fabric.[b]	Prim. Metal[b]	Agric.[b]	Other[d]	Total
1983/84 (Actual)	786	4 498	4 110	3 033	2 636	2 082	1 605	995	439	1 380	870	22 434
FORECAST												
1984/85	804	5 732	3 915	3 078	2 767	2 082	1 380	1 017	449	1 406	885	23 515
1985/86	836	5 240	3 080	3 146	2 881	2 129	1 629	1 057	467	1 434	921	22 820
1986/87	860	3 359	3 080	3 222	3 020	2 183	1 791	1 088	480	1 470	940	21 493
1987/88	886	3 359	3 080	3 343	3 160	2 237	1 612	1 121	495	1 517	973	21 783
1988/89	910	3 359	3 080	3 461	3 300	2 291	1 757	1 152	508	1 562	1 008	22 388
1989/90	929	3 359	3 080	3 553	3 439	2 344	1 750	1 175	519	1 609	1 033	22 790
1990/91	947	3 359	3 080	3 645	3 578	2 398	1 743	1 198	529	1 657	1 060	23 194
1991/92	966	3 359	3 080	3 738	3 718	2 452	1 736	1 222	539	1 705	1 086	23 601
1992/93	987	3 359	3 080	3 828	3 856	2 504	1 728	1 245	550	1 754	1 113	24 004
1993/94	1 003	3 359	3 080	3 921	3 996	2 559	1 721	1 269	560	1 802	1 140	24 410
1994/95	1 021	3 359	3 080	4 013	4 137	2 613	1 714	1 292	570	1 850	1 166	24 815
Avg Ann Growth: % 11 Yrs: 83/84-94/95	2.4	(2.6)	(2.6)	2.6	4.2	2.1	0.6	2.4	2.4	2.7	2.7	0.9

[a] Standard Industrial Classification disaggregation of general and interruptible natural gas load is available starting with 1983/84.

[b] Each category is forecast by an independent variable (noted in brackets): Construction (Construction GDP) food and beverage (retail activity), paper and allied (Woodbridge Reed activity for Lower Mainland), wood manufacturing (Woodbridge Reed activity for Lower Mainland), chemical and chemical products (chemical pulp production), metal fabrication (construction GDP), primary metal (construction GDP), and agriculture (agriculture GDP).

[c] Non-metal mineral load is largely associated with two cement plants. Drop in load is due to fuel switching at these plants. Petroleum and coal load is largely associated with refineries. Drop in load is due to lower capacity utilization as refined petroleum products are shipped from more efficient refineries in Alberta via Trans Mountain Pipeline.

[d] Other is mining (20.8 TJ) and miscellaneous manufacturing. Mining load is increased by H. N. Halvorson estimates of sand and gravel production. Miscellaneous manufacturing load is increased by manufacturing GDP.

Table 20

B. C. HYDRO HISTORICAL AND PROBABLE LOWER MAINLAND NATURAL GAS FORECAST
BY SALES CATEGORIES
(Billed Basis, No Adjustment For Accrual)
(TJ)

Fiscal Year	Residential	Commercial	Industrial	Natural Gas For Vehicles[a]	Other	Total Sales	General		Interruptible[b]
							With Heat	without Heat	
1983/84 (Actual)[c,d]	37 402	30 367	22 434	134	196	90 533	30 952	2 726	19 123
FORECAST									
1984/85	38 490	30 807	23 515	280	192	93 284	32 258	2 683	19 381
1985/86	39 674	31 258	22 820	630	191	94 573	32 372	2 616	19 090
1986/87	40 498	31 788	21 493	1 220	199	95 198	32 850	2 570	17 861
1987/88	41 273	32 273	21 783	1 670	203	97 202	33 665	2 520	17 871
1988/89	41 827	32 771	22 388	2 100	204	99 290	35 149	2 467	17 543
1989/90	42 280	33 321	22 790	2 535	209	101 135	36 119	2 431	17 561
1990/91	42 583	33 865	23 194	2 735	215	102 592	37 445	2 390	17 224
1991/92	42 867	34 404	23 601	2 915	219	104 006	38 426	2 337	17 242
1992/93	43 171	34 946	24 004	3 080	221	105 422	39 750	2 296	16 904.
1993/94	43 614	35 489	24 410	3 240	225	106 978	40 723	2 254	16 922
1994/95	44 117	36 035	24 815	3 360	230	108 557	41 710	2 201	16 939
Avg Ann Growth: % 11 Yrs: 83/84-94/95	1.5	1.6	0.9	34.0	1.5	1.7	2.7	(1.9)	(1.1)

[a] In 1983/84, 100 TJ was sold on interruptible basis.

[b] Normal 30 day curtailment of interruptible sales.

[c] Disaggregation of general and interruptible loads to commercial and industrial categories has not yet been extended historically.

[d] All historical loads have been normalized for weather.